AN E-GOVERNMENT READINESS MODEL

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The purpose of this study is to develop an e-government readiness model and to test this model. Consistent with this model several instruments, IS assessment (ISA), IT governance (ITG), and Organization-IS alignment (IS-ALIGN) are examined for their ability to measure the readiness of one organization for e-government and to test the instruments fit in the proposed e-government model. The ISA instrument used is the result of adapting and combining the IS-SERVQUAL instrument proposed by Van Dyke, Kappelman, and Pybutok (1997), and the IS-SUCCESS instrument developed by Kappelman and Chong (2001) for the City of Denton (COD) project at UNT. The IS Success Model was first proposed by DeLone and McLean (1992), but they did not validate this model. The ITG instrument was based on the goals of the COD project for IT governance and was developed by Sanchez and Kappelman (2001) from UNT. The IS-ALIGN instrument was also developed by Sanchez and Kappelman (2001) for the COD project. It is an instrument based on the Malcolm Baldrige National Quality Award (MBNQA) that measures how effectively a government organization utilizes IT to support its various objectives. The EGOV instrument was adapted from the study of the Action-Audience Model developed by Koh and Balthazrd (1997) to measure how well a government organization is prepared to usher in e-government in terms of various success factors at planning, system and data levels.

An on-line survey was conducted with employees of the City of Denton, Texas. An invitation letter to participate in the survey was sent to the 1100 employees of the City of Denton via email, 339 responses were received, yielding a response rate of 31%. About 168 responses were discarded because they were incomplete and had the missing values, leaving 171 usable surveys, for a usable set of responses that had a response rate of 16%.

Although the proposed and some alternate models were partially consistent with the hypothesized theory, the confirmation of the relationships among the constructs warrants further research via either by replication of this research or by development a new theoretical model. However, the significant validity and reliability measures obtained in this study indicate that the e-government readiness model has the potential for use in future studies.

ACKNOWLEDGMENTS

I am greatly indebted to many people who assisted in the completion of this study. First and foremost, my major advisor, Dr. Victor R. Prybutok, gave me the benefit of his expertise, generosity, and friendship through the highs and lows of the process. His association was essential for the completion of this project as well as my personal development as a researcher.

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Finally, I would like to say a large and hearty thank you to my family who lives in Taiwan for their unwavering support and confidence. It is my great honor to dedicate this work to them.

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CHAPTER 1

INTRODUCTION

A worldwide revolution in information and communications technologies is occurring (Boyle, 2000). The Internet revolution has dramatically changed how citizens and businesses relate to their government, creating an evolution in expectations (Dodd, 2000). Electronic government (e-government) is a way for governments to use new technologies to provide people with more convenient access to government information and services, to improve the quality of the services and to provide greater opportunities to participate in the democratic institutions and processes (Boyle, 2000). The promise of e-government is quickly becoming a reality (Dodd, 2000). E-government is no longer an option; it is inevitable (Patterson & Hanson, 2001). For government, the question now is not whether they are going to provide electronic services, but how and when.

Moreover, Boyle (2000) points out that there are three primary reasons why e-government is important. It encourages the take-up of digital technologies that are crucial to economic competitiveness, it allows government to redefine its role and become more citizen-focused, and it can reduce the cost while not compromising the quality of public services (Boyle, 2000). This study will concentrate on e-government readiness to embrace IT by using technology integration and business alignment as a foundation. This study will also propose an e-government readiness model that helps organizations maximize the benefits derived from their IT by more completely understanding the interplay between IT and the rest of the organization. The e-government readiness model

will allow an exploration of the relationships among IS structure, organizational structure and readiness for e-government. In particular, the readiness model will assist an organization that would like a comprehensive baseline assessment and assistance in developing strategies for long-term improvements.

In terms of these comprehensive baseline needs of the relationships among IS structure, organizational structure and readiness for e-government, this study is first, an examination of information quality, system quality, service quality, and their effects on IS use, user satisfaction, and ultimately forming different impacts among the organizational IS structure. Secondly, it is an examination of how an organization governs its objectives for IT to enhance the government's readiness and move forward with e-government. Thirdly, it is an examination of the types and degrees of alignments among subsystems of the organizational operations and the processes by which IT decisions are made and implemented. Finally and most importantly, it is an examination of the organizational readiness for providing e-government capabilities including measures of the readiness of the organization, its employees, and technology, to accomplish its e-government initiatives.

Overview of the Study

This study examines and compares several assessment instruments such as an information system assessment (ISA) instrument based on IS-SERVQUAL as proposed by Van Dyke, Kappelman, and Pybutok (1997), and the theory of IS Success Model (DeLone & McLean, 1992); an assessment instrument of organizational structure based on the theory of IT governance (Information Systems Audit & Control Foundation, 2000), and an instrument based on Malcolm Baldrige National Quality Award (MBNQA;

U.S. Dept of Commerce, 1987); and an e-government assessment instrument based on the Three-Ring Model of the Internet integration strategy framework as proposed by Koh and Balthazard (1997). Subsequently, there are four potential constructs in the study including both IS-SUCCESS and IS-SERVQUAL combined and referenced as IS assessment (ISA) in the IS structure in this study; IT governance (ITG) and organization-IS alignment (IS-ALIGN) separately in the organizational structure; and readiness for e-government (EGOV). There are several reasons why this study combines IS-SUCCESS and IS-SERVQUAL into ISA. DeLone and McLean's IS Success Model (1992) needs further development and validation before it can serve as a basis for the selection of appropriate IS measures (DeLone & McLean, 1992) because researchers such as Myers, Kappelman, and Prybutok (1998) have proposed modification to DeLone and McLean's IS success model to include service quality. Also, Pitt, Watson, and Kavan (1995) point out that there is a danger that IS researchers will mismeasure IS effectiveness if they do not include in their assessment package a measure of IS service quality.

The IS Success Model and IS-SERVQUAL constitute the theoretical frameworks of IS assessment (ISA) in the study, which attempt to measure system quality, information quality, service quality, IS use, user satisfaction and ultimately producing some impacts within an organization. The ISA assessment (ISA) of this study corresponds to a revised model of DeLone and McLean's IS Success model (1992) that has a new dimension added, service quality (also conforms to Myers, Kappelman, and Prybutok's (1998) suggested modifications and refers as the Comprehensive IS Assessment Model). DeLone and McLean's IS Success model (1992) employs an IS-specific perspective and reflects the relationships of six IS Success dimensions (i.e.,

system quality, information quality, use, user satisfaction, individual impact, and organizational impact). DeLone and McLean's model is regarded as a comprehensive IS assessment model in the IS domain (Myers, Kappelman, & Prybutok, 1997; Seddon, 1997). The IS-SUCCESS instrument in the study was invented by Kappelman and Chong (2001). SERVQUAL (Parasuraman, Zeithaml, & Berry, 1988) is a popular instrument for measuring service industries such as banking and credit card processing. Van Dyke, Kappelman, and Prybutok (1997) proposed a modified version of an IS service quality instrument. This proposed IS-SERVQUAL instrument measures service quality of an IS provider or IS support team in the organization.

The IT governance (ITG) instrument helps meet the multiple needs of management by bridging the gaps among business risks, control needs and technical issues. The ITG instrument, invented by Sanchez and Kappelman (2001), is based on the framework of Control Objectives for Information and related Technology (COBIT; The COBIT Steering Committee and the IT Governance Institute ™, 2000). The COBIT framework contains a set of control objectives and is grouped into four domains: planning and organization, acquisition and implementation, delivery and support, and monitoring. This structure covers all aspects of information and the technology that supports ITG. IT governance in the COBIT framework integrates IT performance in a manner that allows maximizing benefits, capitalizing on opportunities and gaining competitive advantage (The COBIT Steering Committee and the IT Governance Institute ™, 2000).

The Strategic Alignment Model (SAM; Henderson & Venkatraman, 1993) and Malcolm Baldrige National Quality Award (MBNQA; U.S. Department of Commerce,

1987) constitute the theoretical frameworks on which the IS-ALIGN questions were based. The IS-ALIGN instrument, invented by Sanchez and Kappelman (2001), addresses both how IT is in harmony with the business, and how the business should, or could be in harmony with IT (Luftman, 2000). IS-ALIGN measures how the functions of IT relate to organization functions. MBNQA provides an organization-wide perspective and provides a foundation for the IS-ALIGN instrument questions. The framework of MBNQA contains three basic elements: (1) strategy and action plans, (2) system (including dimensions of leadership, strategic planning, customer and market focus, human resource focus, process management, business results), and (3) information and analysis.

The theoretical framework of e-government (EGOV) represented by the Three-Ring Model of the Internet integration strategy framework as proposed by Koh and Balthazard (1997) also underlies this study. Koh and Balthazard (1997) investigate how organizations integrate different Internet applications into a coherent and effect business tool at three different levels: (1) business planning level, (2) system management level, and (3) data infrastructure level. The e-government readiness (EGOV) instrument based on the Three-Ring Model in this study is assessed at three levels: planning, system and data levels. The objective of this study is to measure the readiness of the organization, its employees, and technology to accomplish its e-government initiatives. The e-government readiness model allows for an exploration of the relationships among IS structure (DeLone and McLean's IS Success model and IS-SERVQUAL), organizational structure (ITG and IS-ALIGN) and readiness for e-government (EGOV). This study focuses on the

readiness for e-government to embrace IT by using technology integration and business alignment as a backdrop.

Figure1 sums up the formation of the potential e-government readiness model. The relationship between ISA and EGOV is explicitly formed in the potential e-government readiness model, based on DeLone and McLean's (1992) IS Success Model. Moreover, Myers, Kappelman, and Prybutok (1998) in their Comprehensive IS Assessment model also point out the importance of the IS assessment model for investigating various issues within the context of the organization and the external environment such as organizational goals, tasks, structure, volatility, and management philosophy. ITG and IS-ALIGN are parts of the organization environment in the model. In turn, the organization environment eventually brings in organizational impact. The relationships among ISA, ITG, IS-ALIGN, and EGOV are hypothesized in the model. As shown in Figure 1, ISA serves the role of driver, ITG and IS-ALIGN the role of moderator, and EGOV the role of outcome.

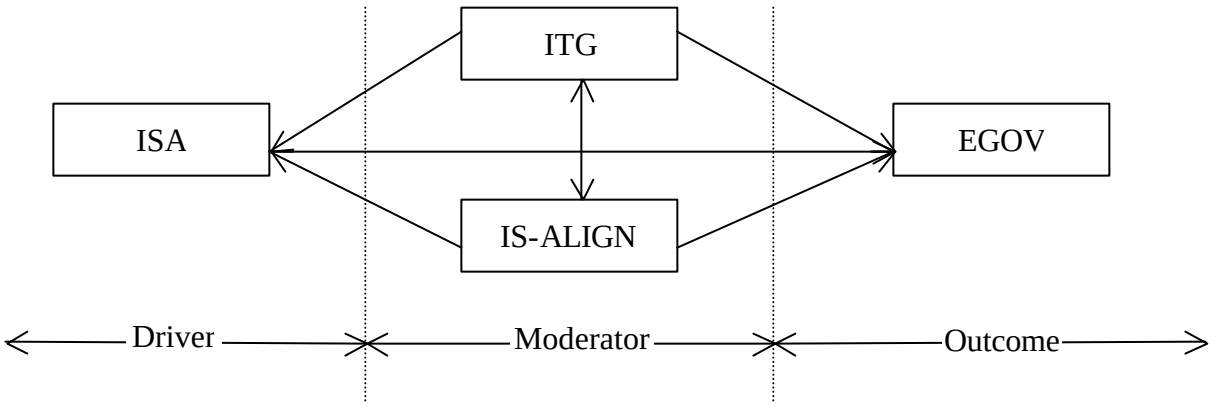


Figure 1. Potential e-government readiness model.

Statement of the Problem

Changes in IT environments are fostering the transformation of organizations (Mahmood & Mann, 2000). Demonstrating the IT effects on organizational performance has proven difficult, despite the enormous investment in IT during recent years (Mahmood & Mann, 2000). The basic assumption of the IS assessment efforts to date is that IS quality and productivity affect organizational performance (Van Dyke, Kappelman, & Prybutok, 1997; Mahmood & Mann, 2000). Yet most proposed models were developed with a focus on an IS perspective and, as a result of such development, reside in an IS-specific domain. Although these models suggest a connection between IS quality and business performance, an IS quality in itself does not ensure organizational success (Mahmood & Mann, 1993; Keen, 1988). It seems that the link between the IS function and the other business functions in the organization was not well established in previous IS studies (Mahmood & Mann, 1993; Keen, 1988). This study will attempt to establish such a connection through an e-government readiness model.

This study addresses the following two major questions:

1. How to develop and validate an instrument to assess readiness for e-government?

2. How to assess the readiness of the organization, its employees, and technology, to accomplish its e-government initiatives?

Research Hypothesis

The purpose of this study is to assess the readiness of the organization, its employees, and its technology to accomplish its e-government initiatives by developing and validating an instrument to assess readiness for e-government. Four potential

constructs (i.e., ISA, ITG, IS-ALIGN, and EGOV) are investigated in an attempt to explore the relationships among IS structure (DeLone and McLean's IS Success model and IS-SERVQUAL), organizational structure (ITG and IS-ALIGN) and readiness for e-government (EGOV). IS structure is constituted by IS-SUCCESS and IS-SERVQUAL and collectively referred to as ISA in this study. The purpose of the ISA instrument is to measure the impact of the IS structure on the organization. The dimensions of the ISA instrument include information quality, system quality, service quality, use, user satisfaction, individual impact and organization impact.

The organizational structure consists of IT governance (ITG) and organization-IS alignment (IS-ALIGN). ITG integrates IT performance in a manner that allows maximizing benefits, capitalizing on opportunities and gaining competitive advantages. ITG stresses how to govern the business objectives for IT. Organization-IS alignment (IS-ALIGN) addresses both how IT is in harmony with the business, and how the business should, or could be in harmony with IT. IS-ALIGN stresses the relationship between business and IT. The structure of the readiness for e-government (EGOV) is to investigate how organizations integrate different Internet applications into a coherent and effective business tool at three different levels: business planning level, system management level, and data infrastructure level. EGOV measures the readiness of the organization, its employees, and its technology, to accomplish its e-government initiatives. According to the model designed in the study, the following research hypotheses will be tested:

Hypothesis 1: IT governance impacts IS.

Hypothesis 2: The organization-IS alignment impacts IS.

Hypothesis 3: IS impacts the readiness for e-government.

Hypothesis 4: There is a connection between IT governance and the organization-IS alignment.

Hypothesis 5: The organization-IS alignment impacts the readiness for e-government.

Hypothesis 6: IT governance impacts the readiness for e-government.

Purpose of the Study

This study will focus on the readiness of e-government to embrace IT by using technology integration and business alignment as a backdrop. The purpose of the proposed research is to develop effective assessment measures of e-government readiness in an organization-wide and IS specific perspective. The study will investigate the relationships among the different instruments (ITG, IS-ALIGN, and ISA) and their relationship to the readiness of e-government (EGOV). The goal of the study is to maximize the benefits derived from IT investments by more completely understanding the interplay between IT and the organization. Although applicable to any kind of organizations (e.g., government, not-for-profit, or for-profit), the study will focus on and develop a set of guidelines to assist government in transforming itself to better utilize IT.

Significance of the Study

The purpose of this study is to investigate the relationships among the different instruments (ISA, ITG, and IS-ALIGN) and their relationship to the readiness of e-government (EGOV). The results of the research should help clarify the relationships among the different instruments (ISA, ITG, IS-ALIGN, and EGOV).

Results from this study should provide effective assessment measures of e-government readiness in an organization-wide and IS specific perspective. The results should offer evidence as to how to assess the readiness of the organization, its employees, and technology, to accomplish its e-government initiatives.

These findings potentially impact e-government initiatives because they should help identify the role of government in the information age. This study should also contribute to the development of better digital or electronic organizations and better ways to ensure the adoption of these governments into the new information age.

General Limitations

Limitations are an inherent part of any research. As with any field research, only partial control is possible and there is limited ability to accommodate extraneous variables (Buckley, Buckley, & Chiang, 1976). Also, participants have different levels of expertise and familiarity with the research topic. There are some limitations that arise from the Web-based survey used in this study.

1. The questionnaire attempts to measure a number of dimensions, and it is relatively long. The length of the questionnaire may have led to answers that were less valid due to fatigue or the unwillingness of participants to seriously answer the large number of questions.

2. Since the questionnaire attempts to measure a number of dimensions, it cannot probe deeply into the respondents' opinions and feelings.

3. The questionnaire is self-reported by respondents, so it involves the potential problems of honesty, social desirability, or motivation for thoughtful response, etc.

4. Random, unexplained errors, always exist in survey design and administration.

5. Linear models of the research process are notoriously susceptible (McGrath, Martin, & Kukla, 1982) and may not reflect actual practice.

6. No manifest measurement or any other latent construct is one hundred percent perfect: there is always measurement error to consider (Kelloway, 1998).

7. Both estimation methods (e.g., maximum likelihood) and tests of model fit (e.g., the X^2 test) in LISREL are based on the assumption of large samples. According to Kelloway's (1998) definition of "large," a sample size of at least 200 observations would be an appropriate minimum. The valid data in this study is 171 cases, which is lower than the basic sample requirement of structural equation modeling (SEM). The small simple size is the primary problem encountered in this study.

There are several conceptual limitations that arise from the model designed in this study.

1. The instruments used in this study are new and despite following all recommended instrument development procedures, there remains some uncertainty about each of the instrument's validity. This concern coupled with the single organization and small sample size used in this study imply that all instrument development work be viewed as preliminary.

2. In addition, this work fails to account for the impact of such potential moderating variables as culture, gender, etc.

3. Also, the IT governance and the organization-IS alignment constructs are relatively new issues, and their theoretical foundation may require further development. Combining IS-SERVQUAL and IS-SUCCESS together in one factor analysis by using the 0.5 and 0.3 rule is one approach to addressing the theoretical issues raised in this

work. Other approaches such as examining the relationship between the instruments also merits consideration.

Definitions

Control Objectives for Information and Related Technology (COBIT)

Control Objectives for Information and Related Technology (COBIT) refer to a tool to help auditors judge complex security and control issues related to IT, developed by Information Systems Audit and Control Foundation (2000).

E-government (EGOV)

E-government (EGOV) is defined as the delivery of services and information, electronically, to businesses and residents, 24 hours a day, seven days a week. E-government is not limited to Web-based services (Norris, Fletcher, & Holden, 2001).

Government

Government is the means by which society pursues essential objectives: maintaining collective security, administering justice, providing the institutional infrastructure of the economy, ensuring that vital social capital is enhanced through improvements in health and education and through strong families and communities (Dawes, Bloniarz, & Kelly, 1999).

Information System (IS)

Information System (IS) refers to a physical process that supports an organizational system by providing information to achieve organizational goals (Turban, McLean, & Wetherbe, 1996).

Information System Assessment (ISA)

Information System Assessment (ISA) refers to the measures of information systems. IS assessment (ISA) in this study includes two frameworks: (1) IS Success Model (DeLone & McLean, 1992), and (2) IS-SERVQUAL (Van Dyke, Kappelman, & Prybutok, 1997).

Information Technology (IT)

Information Technology (IT) refers to the technological side of an information system, including hardware, databases, software networks, and other devices and can viewed as a subsystem of an information system (Turban, McLean, & Wetherbe, 1996).

Internet

Internet refers to the global public access collection of interconnected networks for communicating digital information. The World Wide Web (WWW) is a hypertext publishing facility of the Internet.

IT Governance (ITG)

IT governance is integral to the success of business governance because proper governance can assure efficient and effective improvements in business processes. IT governance enables the business to take full advantage of its information, thereby maximizing benefits, capitalizing on opportunities and gaining competitive advantage.

Organization-IS Alignment (IS-ALIGN)

Organization-IS alignment (IS-ALIGN) refers to a relationship between IT and the business, i.e., how IT is in harmony with the business, and how the business should, or could, be in harmony with IT (Luftman, 2000).

Outline of the Report

This paper is organized into six chapters. Chapter 1 presents a brief background and introduction to the research problem, its significance, and the scope pertaining to this research. Chapter 2 includes a summary of the literature, prior research and theoretical foundation, outlines of the assessment framework and model for this study. Chapter 3 describes the development of the instrument, and the research methodology. Chapter 4 presents the results of the survey. Chapter 5 presents a data analysis of the results. Finally, chapter 6 summarizes this research effort and offers suggestions for further research.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

This chapter provides a review of the pertinent literature and is divided into four sections. A review of the literature pertaining to the measurement of IS assessment (ISA), especially the IS Success model (DeLone & McLean, 1992) and the IS-SERVQUAL instrument (Van Dyke, Kappelman, & Pybutok, 1997), is presented in the first section. A review of the literature pertaining to the measurement of IT Governance (ITG) is presented in the second section. A review of the literature pertaining to the measurement of organization-IS alignment (IS-ALIGN), especially Malcolm Baldrige National Quality Award (MBNQA; U.S. Dept of Commerce, 1987) and Strategic Alignment Model (Henderson & Venkatraman, 1993), is presented in the third section. Finally, a review of the literature pertaining to the measurement of e-government (EGOV), especially Gartner's Four Phases of E-government Model (Baum & Di Maio, 2000) and the Three-Ring Model (Koh & Balthazard, 1997), is presented in the fourth section.

The four sections in this chapter categorize and review three different structures which are the IS structure, organizational structure, and readiness for e-government. The e-government readiness model allows for an exploration of the relationships among IS structure (DeLone and McLean's IS Success model, and IS-SERVQUAL), organizational structure (ITG and IS-ALIGN), and readiness for e-government (EGOV). IS structure plays the role of a driver, organizational structure as a moderator, and readiness for e-government, an outcome construct. The literature review will assist in investigating the relationships among the different instruments (ISA, ITG, and IS-ALIGN) and their

relationship to the readiness for e-government (EGOV). Furthermore, as a necessity of this study, the following potential major research questions will be investigated implicitly via the literature review.

?? How to develop and validate an instrument to assess readiness for e-government?

?? How to assess the readiness of the organization, its employees, and technology, to accomplish its e-government initiatives?

The following research sub-questions will also be investigated implicitly in the review of the literature.

?? Does IT governance impact IS?

?? Does organization-IS alignment impact IS?

?? Does IS impact how an organization uses IT?

?? Is there a connection between how an organization governs its objectives for IT, and how it aligns IT and the business?

?? Does organization-IS alignment impact how an organization uses IT?

?? Does IT governance impact how an organization uses IT?

Driver: Measures of IS Assessment (ISA)

Importance of ISA to the Research Questions

Two IS assessment models, DeLone and McLean's IS Success model (1992) and IS-SERVQUAL (Van Dyke, Kappelman, & Prybutok, 1997), are incorporated into the IS assessment (ISA) framework. After comparing their constructs and identifying the relationships among the measurements, the IS assessment in this study examines the measurement of the Comprehensive IS Assessment and Contingency Theory which was developed by Myers, Kappelman, and Prybutok (1998). The IS structure is a driver in the

study of e-government. It is assumed that ISA will have impact on EGOV directly or indirectly. ITG and IS-ALIGN will have impact on ISA directly or indirectly.

IS Success Model

In the influential article, DeLone and McLean (1992) reviewed 100 papers containing empirical IS Success measures that have been published in seven publications during the seven years 1981-1987. They used the model for communication originally developed by Mason (1978), which was based on the Shannon and Weber model (1949). This is illustrated in the following Figure 2. Ballantine, Bonner, Levy, Martin, Munro, and Powell (1998) also point out that DeLone and McLean's consolidated previous research classified the measures of information systems success into plausible groupings, and began to identify different stakeholders groups in the process.

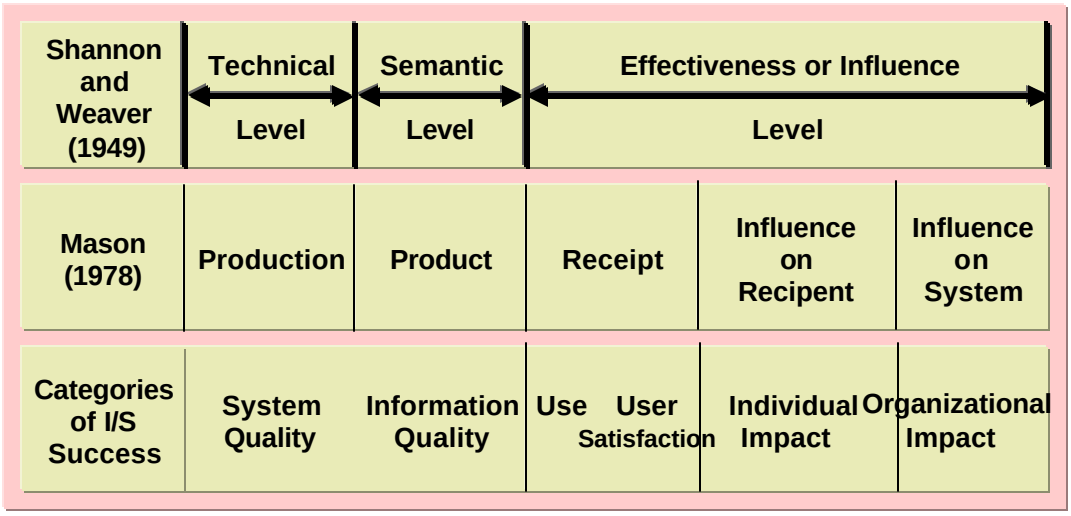


Figure 2. The comparison of the three studies: Shannon & Weaver (1949), Mason (1978), and DeLone & McLean (1992).

DeLone and McLean (1992) classified the huge range of IS Success measures, and towards the end of their paper present their six categories of success measures in the

model shown in Figure 3. They argue that when measuring IS Success, researchers should "systematically combine" measures from their six IS Success categories. They also stress the need for additional research to test the model and for the selection of measures of each IS Success dimension. They present their results in terms of an IS Success Model as follows:

> SYSTEM QUALITY and INFORMATION QUALITY singularly and jointly affect both USE and USER SATISFACTION. Additionally, the amount of USE can affect the degree of USER SATISFACTION- positively or negatively- as well as the reverse being true. USE and USER SATISFACTION are direct antecedents of INDIVIDUAL IMPACT; and lastly, this IMPACT on individual performance should eventually have some ORGANIZATION IMPACT." (pp. 83)

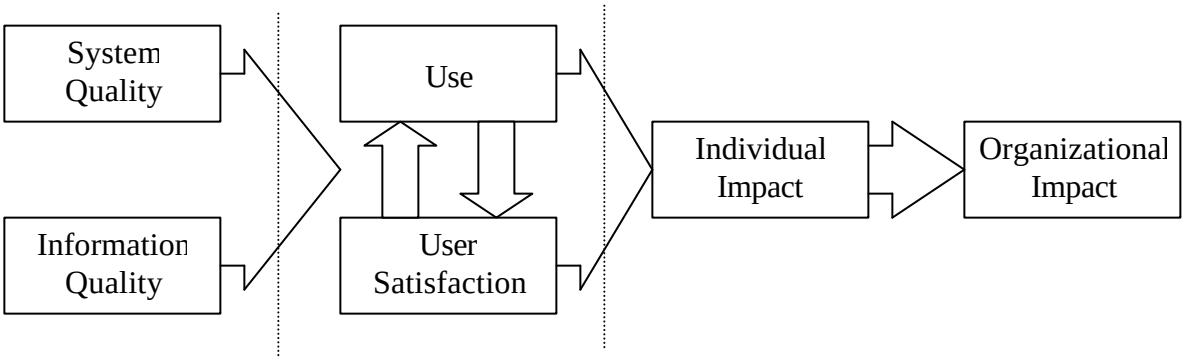


Figure 3. IS Success Model (DeLone & McLean, 1992).

The definitions of the constructs of the IS Success Model used in Figure 3 based on the study of DeLone and McLean (1992) are described as follows:

1. System Quality: System quality refers to measures of the information processing system itself. System quality is the desired characteristics of the IS itself which are focused on by some IS researchers. These desired characteristics of the IS itself include convenience of access, flexibility of system, integration of systems, response time, realization of user expectations, reliability, ease of use, ease of learning, usefulness of IS, etc.

2. Information Quality: Information quality refers to measures of IS output. Information quality is the information product for desired characteristics, such as accuracy, precision, currency, reliability, completeness, conciseness, relevance, understandability, meaningfulness, timeliness, comparability, and format.

3. Use: The use of IS refers to recipient consumption of the output of an IS. The use of IS models is one of the most frequently reported measures of the success of IS (Ein-Dor & Segev, 1978; Hamilton & Chervany, 1981). Different measures of computer success are mutually interdependent, so the system use is chosen as the primary criterion construct for the IS research framework (Ein-Dor & Segev, 1978).

4. User Satisfaction: User satisfaction refers to the recipient response to the use of the output of IS. When the use of IS is required, the preceding measures become less useful, and successful interaction with IS can be measured in terms of user satisfaction. Studies have found that user satisfaction is associated with attitudes toward computer systems so that user satisfaction measures may be biased by user computer attitudes (Lucas, 1978). Therefore, studies that include user satisfaction as a success measure should ideally also include measures of user attitudes so that the potentially biasing effects of those attitudes can be controlled in the analysis.

5. Individual Impact: Individual impact refers to the effect of information on the behavior of the recipient. Individual impact also indicates that the IT environment has given the user a better understanding of the decision context, has improved the user's decision-making productivity, has produced a change in the user's activity, or has changed the decision maker's perception of the importance or usefulness of the IT environment. Emery (1971) states that information has no intrinsic value; any value

comes only through the impact it may have on physical events. Such impact is typically exerted through human decision makers.

6. Organizational impact: Organizational impact refers to the effect of IT on organizational performance. More comprehensive studies of the effect of computers on an organization include both revenue and cost issues within a cost and benefit analysis (Emery, 1971).

The IS Success model is an attempt to reflect the interdependent, and to process the nature of IS Success. DeLone and McLean's (1992) paper is an important contribution to the literature on IS Success measurement because it is the first study that tries to impose some order on IS researchers' choices of success measures. Myers, Kappelman, and Prybutok (1998) think that DeLone and McLean's IS Success model is the most comprehensive IS assessment model offered by IS research thus far. Seddon and Kiew (1994) are the first to publish an empirical study of the DeLone and McLean's IS Success Model. They test a slightly modified version of the first four dimensions of the model and the relationships between them. Their testing results support DeLone and McLean's model. Table 1 represents a summary of measured items for the DeLone and McLean's IS Success model. These measured items will be used in the instrument of this study.

Table 1

Summary of Measured Items for the DeLone and McLean's IS Success Model (1992)

Domains	Measured Items
System Quality	Reliability, Ease of use, Accessibility, Usefulness, and Flexibility
Information Quality	Content, Availability, Accuracy, Timeliness, Conciseness, and Convenience
Use	Frequency of use
User Satisfaction	Degree of satisfaction with IS function
Individual Impact	Executive efficiency, Higher-quality decisions, Communication, and Operational

	control
Organizational Impact	Profitability, Productivity, and Financial improvement

The model of DeLone and McLean was expanded by Myers, Kappelman and Prybutok (1997), specifically through the inclusion of a service quality dimension, and the contingency theory for IS assessment (see Figure 4). The relevant contingency constructs consist of consumer versus industrial user sector, purchase infrequency, and stage of product life cycle, etc. The broadest contingency categories of relevance to the IS function appear to be organizational and external environmental. The purpose of considering the contingency theory is to provide a guide for an IS assessment selection strategy that neither dictates a universal solution that is unrealistic for most organizations nor advocates a situation specific view that provides no assistance for the given context. The IS assessment (ISA) domain in this study will test the entire comprehensive model including domains of service quality, system quality, information quality, use and user satisfaction, individual impact and organizational impact, presumptively.

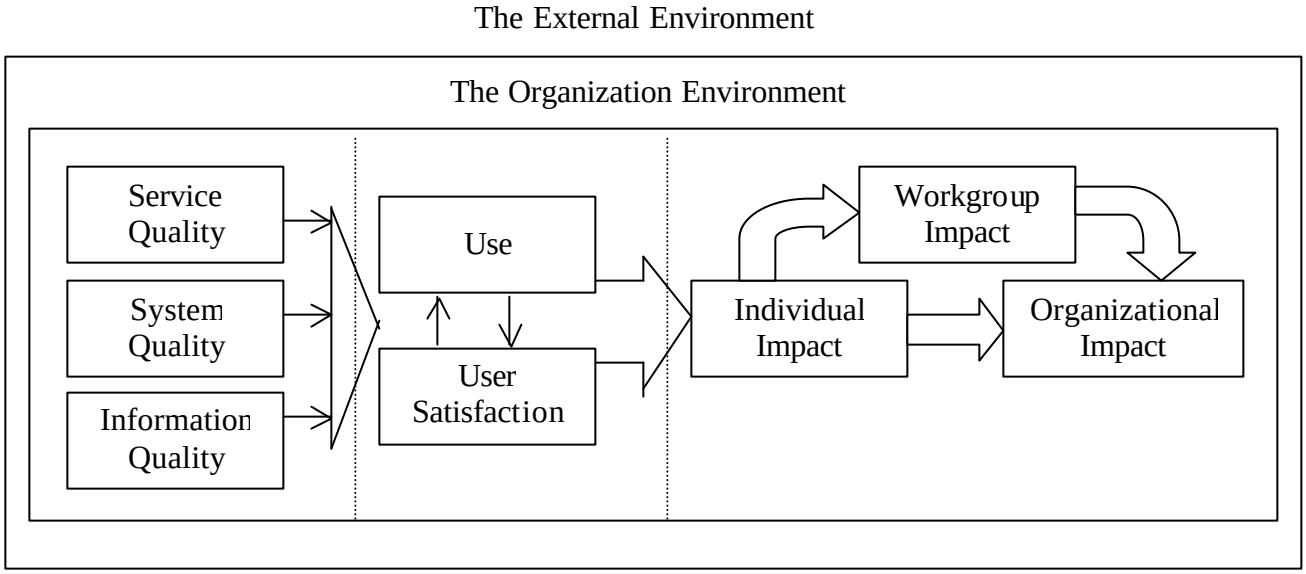


Figure 4. Comprehensive IS Assessment and contingency theory (Myers, Kappelman, & Prybutok, 1998).

IS-SERVQUAL

Parasuraman, Zeithaml, and Berry (1985) propose the service quality determinants, and suggest that, regardless of the type of service, users have similar criteria for evaluating service quality. Their initial research resulted in a model of service quality with distinct gaps occurring in organizations that influence service quality performance, as perceived by users. Their exploratory research reveals that criteria used by users to evaluate service quality fit into the potentially overlapping dimensions. These 10 dimensions below become the foundation of the service quality domain from which items were derived to develop the SERVQUAL scale in 1988. This model provides considerable help for the IS manager in knowing how to measure service quality.

- ?? Reliability involves consistency of performance and dependability.
- ?? Responsiveness concerns the willingness or readiness of employees to provide service.
- ?? Competence means possession of the required skills and knowledge to perform the service.
- ?? Access involves approachability and ease of contact.
- ?? Courtesy involves politeness, respect, consideration, and friendliness of contact personnel.
- ?? Communication means keeping users informed in language they could understand and listen to them.
- ?? Credibility involves having the customer's best interests at heart such as trustworthiness, believability, and honesty.
- ?? Security is the freedom from danger, risk, or doubt such as physical safety, financial security and confidentiality.
- ?? Understanding/Knowing the users involves making the effort to understand the user's needs.
- ?? Tangibles include the physical evidence of the service

Moreover, the work of Parasuraman, Zeithaml, and Berry (1988) conceptualizes service quality as a 5-dimensional construct consisting of tangibles, reliability,

responsiveness, assurance, and empathy. They identify 22 items to measure these 5 dimensions below based on a series of studies through several iterations, universally across service industries. The SERVQUAL instrument is designed to be broadly applicable to service industries, and has been used by researchers (Augustyn & Ho, 1998; Ryan & Cliff, 1997; Ryan & Cliff, 1996; Cronin Jr. & Taylor, 1992; Babakus & Boller, 1992; Carman, 1990; Parasuraman, Zeithaml, & Berry, 1988) in replication studies in service industries, such as banking service, credit card processing service, repair and maintenance service, long distance telephone service, etc.

- ?? Tangibles: The appearance of physical facilities, equipment, personnel, and communication materials.
- ?? Reliability: The ability to perform the promised service dependably and accurately.
- ?? Responsiveness: The willingness to help users and to provide prompt service.
- ?? Assurance: The knowledge and courtesy of employees and their ability to convey trust and confidence.
- ?? Empathy: The provision of caring individualized attention to users.

However, a number of problems with the SERVQUAL instrument have been discussed in the literature (Babakus & Boller, 1992; Carman, 1990; Cronin Jr. & Taylor, 1992 & 1994; Teas, 1993). Van Dyke, Kappelman, and Prybutok (1997 & 1999) also indicate that SERVQUAL suffers from a number of difficulties. The difficulties associated with the measure that are identified in the literature can be grouped in four main categories: (1) the use of difference or gap scores; (2) poor predictive and convergent validity; (3) the ambiguous definition of the expectation construct; and (4) unstable dimensionality. Taking the problems cited above into consideration, a modified version of IS-SERVQUAL was proposed by Van Dyke et al. (1997). After conducting exploratory research with a series of executive and focus groups interviews, they found a

set of ten dimensions in forming expectations and perceptions of information systems service quality. The instrument developed by Van Dyke et al. will be used in this study.

The instrument results in one-half as many questions as the traditional SERVQUAL while eliminating the many psychometric, methodological and statistical problems associated with the use of difference scores. However, unlike the use of a perceived-performance only scoring method, the new instrument maintains the disconfirmation-of-expectations construct for perceived service quality. Table 2 shows the determinants and descriptions of IS-SERVQUAL.

Table 2

Determinants and Descriptions of IS-SERVQUAL (Van Dyke, Kappelman & Prybutok, 1997)

Determinants	Descriptions
Reliability	The extent to which the management information science (MIS) staff performs promised service dependably.
Competence	The technical skills and expertise of the MIS staff.
Responsiveness	The willingness and speed with which the MIS staff makes an initial response to inquires from users.
Timeliness	The elapsed time between a user's request and the design, development and implementation of new applications or change requests by the MIS staff.
Communications	The exchange of pertinent information between the MIS staff and the users.
Training	The amount of instruction and support for learning that is afforded to the user to increase the user's proficiency in utilizing computer-based IS.
Empathy	The ability of the MIS staff to understand the specific needs of the user.
Attitude/Commitment to user involvement	The commitment of the MIS staff to support user involvement and participation in the design, development, or alteration of computer-based IS.
Relationships	The manner and methods of interaction, conduct, and personal association between users and the MIS staff.
Access	The availability or ease with which the appropriate hardware, software, and people can be utilized to support the users in the performance of their jobs.

Both IS-SUCCESS and IS-SERVQUAL are combined and referenced as IS assessment (ISA) in the IS structure in this study. There are several reasons to explain why this study combines these existing instruments to create ISA. First, although DeLone

and McLean's IS Success model (1992) has proposed a taxonomy and an interactive model as framework for conceptualizing and operationalizing IS Success, "this success model clearly needs further development and validation before it could serve as a basis for the selection of appropriate IS measures," (DeLone & McLean, 1992, pp. 88). Secondly, the emergence of end-user computing in the mid-1980s placed IS organizations in the dual role of information provider (i.e., producing an information product) and service provider (i.e., providing support for end-user developers) (DeLone & McLean, 2000). Commonly used measures of IS effectiveness focus on the products rather than the services of the IS function; thus, there is a danger that IS researchers will mismeasure IS effectiveness if they do not include in their assessment package a measure of IS service quality (Pitt, Watson, & Kavan, 1995; Kettinger & Lee, 1995 & 1997; DeLone & McLean, 2000).

Finally, researchers who have argued that service quality be added to the success model have applied and tested the SERVQUAL (Parasuraman, Zeithaml, & Berry, 1988) measurement instrument in marketing (Pitt, Watson, & Kavan, 1995; Kettinger & Lee 1995). However, recent empirical research of Van Dyke, Prybutok, and Kappelman (1999) has challenged the SERVQUAL metric, identifying problems with the reliability, discriminant validity, convergent validity, and predictive validity of the measure. They also point out that further work is needed in the development of measures for assessing the quality for information services and they propose the IS-SERVQUAL instrument as a replacement for it. For measuring the overall success of the IS structure, as opposed to individual systems, service quality may become the important construct, and may deserve to be added to system quality and information quality as components of IS Success

(DeLone & McLean, 2000). Consequently, the IS Success Model and IS-SERVQUAL constitute the theoretical constructs that are integrated into a single framework for the purpose of IS assessment (ISA). The comprehensive IS assessment model of Myers, Kappelman, and Prybutok (1998) includes these metrics of IS-SUCCESS and IS-SERVQUAL; thus, the IS assessment (ISA) also confirms to their suggested modifications to DeLone and McLean's model.

Moderator: Measures of IT Governance (ITG)

Importance of ITG to the Research Questions

Lainhart (2001) points out that even though the Internet has changed nearly every facet of business management, executives in business always will need to make rational business decisions and stakeholders will require solid assurance regarding enterprise risk and control. As a result, accountants, auditors and business consultants must continue to adapt to the constantly changing environment and increase their knowledge about monitoring information and related systems within their organizations. ITG is an IT governance tool that allows a government to focus on aligning business objectives with IT objectives. ITG is a breakthrough tool that helps enterprises balance IT risks and investment in controls.

The IT governance tool (ITG) and organization-IS alignment (IS-ALIGN) form the organizational structure in the study and the two of them act as moderators in the study. Presumptively, ITG will have impact on ISA directly, and ITG will have impact on EGOV directly. Also, both ITG and IS-ALIGN will have impact on each other. ITG focuses on the IT control, whereas, IS-ALIGN emphasizes the relationship of IT and the

business. The literature review below focuses on the internal organizational structure of ITG and IS-ALIGN.

IT Governance (ITG)

Thierauf (1994) states that evaluation and control of the organizations must be thought through on periodic basis. In this sense, the role of internal and external auditors is fundamental. Based on the concept of permanent control and alignment among business requirements, the Information Systems Audit and Control Foundation (2000) has developed a model called "Control Objectives for Information and related Technology (COBIT)," which is a tool to help auditors judge complex security and control issues related to IT. The main theme of COBIT is employed not only by users and auditors, but also, more importantly, as comprehensive guidance for management and business process owners.

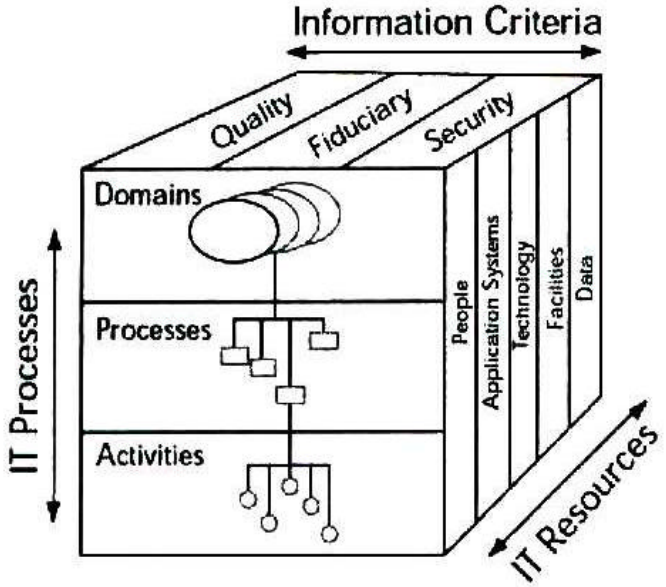


Figure 5. The conceptual framework of COBIT (The COBIT Steering Committee and the IT Governance Institute ™, 2000).

The COBIT Framework consists of high-level control objectives and an overall structure for their classification (see Figure 5). The underlying theory for the classification is that there are, in essence, three levels of IT efforts when considering the management of IT resources. Starting at the bottom, there are the activities and tasks needed to achieve a measurable result. Activities have a life-cycle concept while tasks are more discrete. The life-cycle concept has typical control requirements different from discrete activities. Processes are then defined one layer up as a series of joined activities or tasks with natural (control) breaks. At the highest level, processes are naturally grouped together into domains. Their natural grouping is often confirmed as responsibility domains in an organizational structure and are in line with the management cycle or life cycle applicable to IT processes. Thus, the conceptual framework can be approached from three vantage points: Information criteria, IT resources, and IT processes. These three vantage points are depicted in the COBIT Cube in Figure 5.

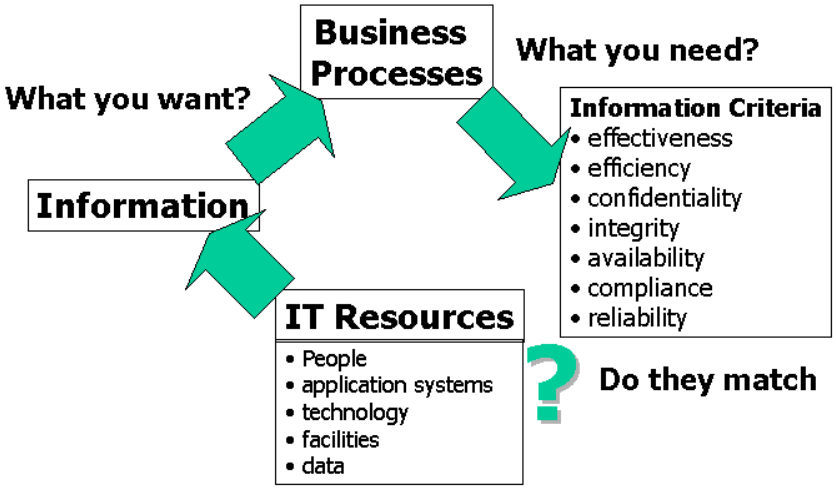


Figure 6. A framework's principles of COBIT (The COBIT Steering Committee & the IT Governance Institute ™, 2000).

The underpinning concept of the COBIT framework is that control in IT is approached by looking at information that is needed to support the business objectives or requirements, and by looking at information as being the result of the combined application of IT-related resources that need to be managed by IT processes (see above Figure 6). To satisfy business objectives, information needs to conform to certain criteria, which IT governance refers to as business requirements for information, in order to ensure that the business requirements for information are met. Consequently, it is necessary to define, implement and monitor adequate control measures over information resources.

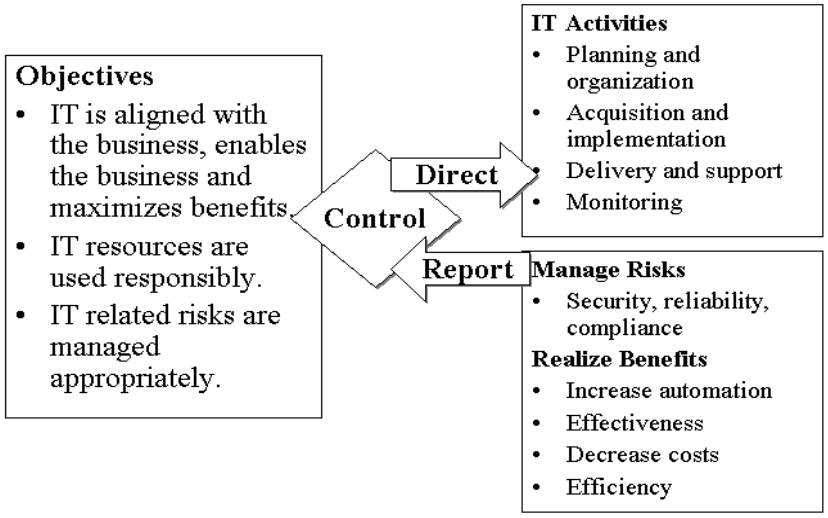


Figure 7. IT governance (ITG; The COBIT Steering Committee and the IT Governance Institute ™, 2000).

Finally and most importantly, IT governance (ITG) provides the structure that links IT processes, IT resources, and information to business strategies and objectives. IT governance integrates and institutionalizes optimal ways of planning and organizing, acquiring and implementing, delivering and supporting, and monitoring IT performance (see Figure 7). IT governance is integral to the success of business governance because

proper governance can assure efficient and effective improvements in business processes. IT governance enables the business to take full advantage of its information, thereby maximizing benefits, capitalizing on opportunities and gaining competitive advantage. IT is also governed by best practices, to ensure that the information and related technology support its business objectives, its resources are used responsibly and its risks are managed appropriately. These practices form a basis for direction of IT activities, which can be characterized as planning and organizing, acquiring and implementing, delivering and supporting, and monitoring, for the dual purposes of managing risks (e.g., to gain security, reliability and compliance) and realizing benefits (e.g., increasing effectiveness and efficiency). Reports are issued on the outcomes of IT activities that are measured against various practices and controls, and the cycle begins again.

The diagram (Figure 8) below illustrates a sound framework of COBIT. The COBIT framework is based on the premise of "In order to provide the information that the organization needs to achieve its objective, and IT resources need to be managed by a set of naturally grouped processes (The COBIT Steering Committee and the IT Governance Institute TM, 2000)." The framework identifies which of the seven information criteria (i.e., effectiveness, efficiency, confidentiality, integrity, availability, compliance, and reliability), as well as which IT resources (i.e., people, applications, technology, facilities and data) are important for the IT processes to fully support the business objectives in the four domains (i.e., planning and organization, acquisition and implementation, delivery and support, and monitoring). Consequently, the COBIT framework provides a tool for the business process owner that facilitates the discharge of this responsibility. This study regards COBIT as the foundation of IT governance (ITG).

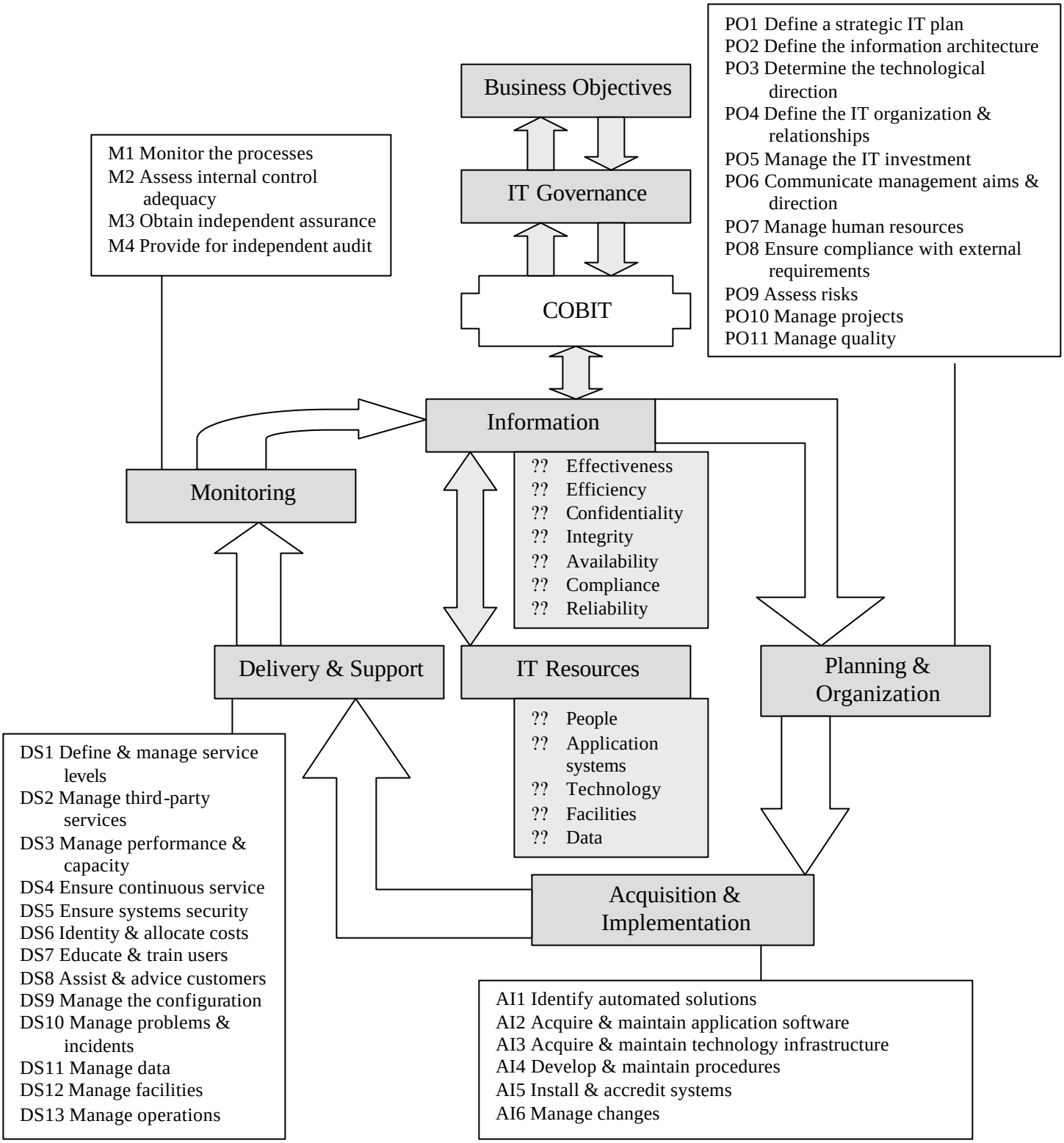


Figure 8. A sound framework of COBIT (The COBIT Steering Committee and the IT Governance Institute ™, 2000).

Moderator: Measures of Organization-IS Alignment (IS-ALIGN)

Importance of IS-ALIGN to the Research Questions

In regard to the best alignment perspective, Henderson and Venkatraman (1993) point out that there is no one universally superior model to formulate and implement strategy. If there were, it would not be strategic because all firms would adopt it. In essence, although IT can alter the basic nature of an industry, the effective and efficient utilization of IT requires the alignment of the IT strategies with the business strategies, something that was not done successfully in the past with traditional approaches (Luftman, Lewis, & Oldach, 1993).

Organization-IS alignment plays a moderating role in the e-government readiness model of this study. The Strategic Alignment Model (SAM; Henderson & Venkatraman, 1993) is the main framework of this section. It is assumed that IS-ALIGN has direct impact on ISA and EGOV, respectively. This study uses the Malcolm Baldrige National Quality Award (MBNQA; U.S. Department of Commerce, 1987) as the organizational framework for developing a set of alignment questions that form the basis of the IS-ALIGN instrument. The MBNQA is introduced briefly in this section. The relationship and comparison of SAM and MBNQA is also described briefly in this section.

Strategic Alignment Model

The Strategic Alignment Model is defined by Henderson and Venkatraman (1993) in terms of four fundamental domains of strategic choice: (1) business strategy, (2) IT strategy, (3) organizational infrastructure and processes, and (4) IT infrastructure and processes, each with its own underlying dimensions (see Figure 9). They illustrated the power of this model in terms of two fundamental characteristics of strategic management:

strategic fit and functional integration. Strategic fit refers to the interrelationships between external and internal components. Functional integration means integration between business and IT domains.

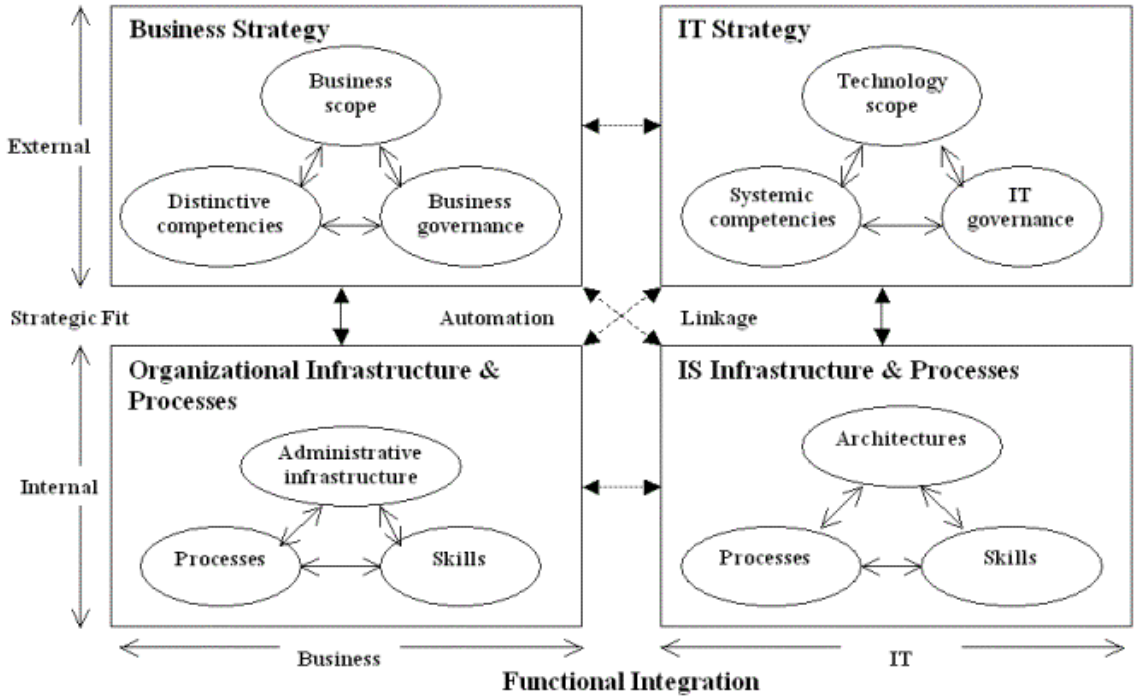


Figure 9. Strategic Alignment Model (Henderson & Venkatraman, 1993).

The four dominant alignment perspectives (i.e., strategy execution, technology transformation, competitive potential, and service level) that use the two strategies as the driver are equally useful and powerful in thinking about the role of IT in organizational transformation. More specifically, four perspectives of alignment are driven with specific implications for guiding management practice. Table 3 represents the four dominant alignment perspectives, and displays the relationships between SAM and MBNQA. The government should have the perspective of the service level and the performance criteria of customer satisfaction.

Table 3

Mapping Between the Four Dominant Alignment Perspectives of MBNQA and SAM

Perspective	Driver	Dominant path	Role of top management	Role of IS management	Performance criteria
Strategy execution	Business strategy	Business strategy ✍ Organizational Infrastructure ✍ IS infrastructure	Strategy formulator	Strategy implementer	Cost/service center
Technology transformation	Business strategy	Business strategy ✍ IT strategy ✍ IS infrastructure	Technology visionary	Technology architect	Technology leadership
Competitive potential	IT strategy	IT strategy ✍ Business strategy ✍ Organizational Infrastructure	Business visionary	Catalyst	Business leadership
Service level	IT strategy	IT strategy ✍ IS infrastructure ✍ Organizational Infrastructure	Prioritizer	Executive Leadership	Customer satisfaction

SAM

MBNQA ← Strategy & Action Plan → System → Information & Analysis →

Luftman, Lewis, and Oldach (1993) proposed the strategic alignment framework to which the SAM was applied. They explored in more pragmatic detail how to translate the SAM into management frameworks and action plans for the transformation of the organization. They reflected the view that business success depends on the linkage of business strategy, IT strategy, organizational infrastructure and processes, and IT infrastructure and processes. They also pointed out why it might not be sufficient to work on any one of these areas in isolation or to only harmonize business and IT strategy. Therefore, strategic alignment has proven to be a vehicle for defining what methods are most appropriate and how the methods should be applied.

Malcolm Baldrige National Quality Award (MBNQA)

The United States Department of Commerce (1987) introduced MBNQA to enhance competitiveness (Bell & Keys, 1998; Decarlo & Sterett, 1990). Specific goals of the MBNQA include promoting awareness of the relationship between quality and competitiveness, increasing understanding about the level of quality required to achieve world class recognition, and fostering the sharing of information about quality by world class organizations (US Department of Commerce, 2000; Bemowski, 1995; Bemkowski & Stratton, 1995). There are many significant benefits derived from using the criteria of MBNQA as a framework for Total Quality Management (TQM) implementation and internal self-assessment (Carrubba, 1992). The importance of a quality IS to the overall quality and productivity of an organization is evident from the inclusion of a dimension of information and analysis in MBNQA. At an organizational level, the MBNQA provides one of the best frameworks to measure organizational quality and productivity.

The MBNQA has nineteen sub-categories under seven major categories. These sub-categories are subdivided into smaller parts again. The core values and concepts of the MBNQA are embodied in seven categories: Leadership, Strategic Planning, Customer and Market Focus, Information and Analysis, Human Resource Focus, Process Management, and Business Results. Figure 10 represents the conceptual framework connecting and integrating these categories. From top to bottom, the MBNQA's framework has three basic elements.

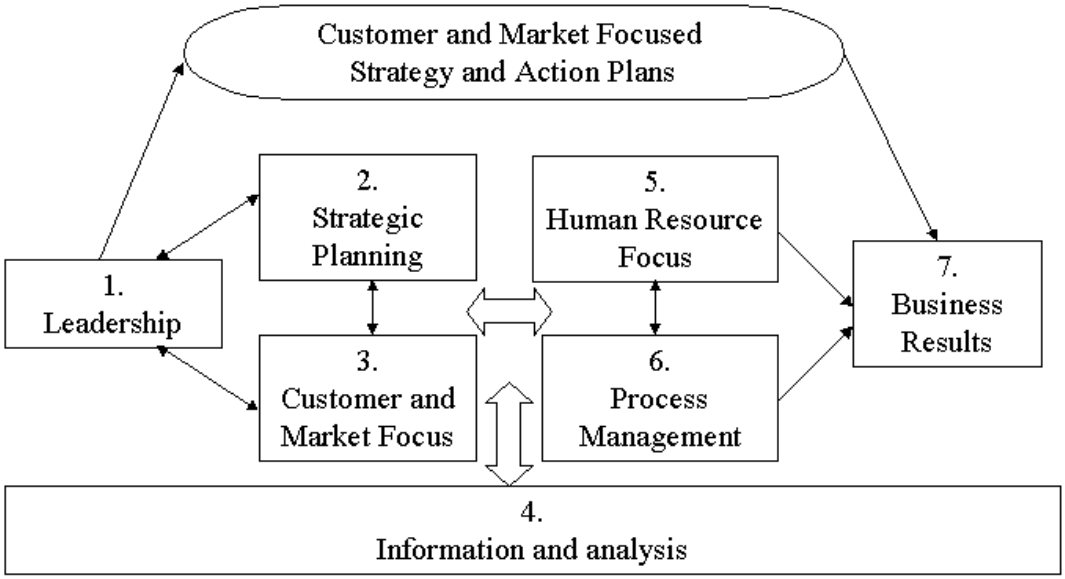


Figure 10. Baldrige criteria for performance excellence framework: A system perspective.

1. Strategy and Action Plans: The strategy and action plans yield the set of customer and market focused performance requirements, derived from short- and long-term strategic planning, that must be met and exceeded for an organization's strategy to succeed. The strategy and action plans guide overall resource decisions and drive the alignment of measures for all work units to ensure customer satisfaction and market success.

2. System: The system is comprised of the six categories in the center of the figure that define the organization, its operations, and its results. Leadership (Category 1), Strategic Planning (Category 2), and Customer and Market Focus (Category 3) represent the leadership triad. These categories are placed together to emphasize the importance of a leadership focus on strategy and customers. Senior leaders must set organizational direction and seek future opportunities for the organization. If leadership does not focus

on customers, the organization as a whole will lack that focus. Human Resource Focus (Category 5), Process Management (Category 6), and Business Results (Category 7) represent the results triad. Organizational employees and its key processes accomplish the work of the organization that yields business results. All actions point toward Business Results, a composite of customer, financial, and operational performance results, including human resource results and public responsibility. The horizontal arrow in the center of the framework links the leadership triad to the results triad, a linkage critical to organizational success. Furthermore, the arrow indicates the central relationship between Leadership (Category 1) and Business Results (Category 7). Leaders must keep their eyes on business results and must learn from them to drive improvement.

3. Information and Analysis: Information and Analysis (Category 4) are critical to the effective management of an organization and to a fact-based system for improving performance and competitiveness. Information and analysis serves as a foundation for the performance management system. In the MBNQA framework, the Information and Analysis category serves as a moderator in a systems perspective.

Prybutok and Spink (1999) developed a survey for the health care industry based on the MBNQA criteria. Their work constitutes a start in establishing the framework that links IS to quality improvement transformations for organizations. Prybutok and Spink also point out that further research is needed to examine the impact on quality improvement of internally and externally generated information delivered through integrated IS.

Outcome: Measures of Electronic Government (EGOV)

Importance of EGOV to the Research Questions

As a public organization prepares for the age of e-government, the study will focus on the readiness for e-government to embrace the Internet by using technology integration and business alignment as a backdrop. This section will introduce two similar models, Gartner's Four Phases of E-government Model (Baum & Di Maio, 2000) and Three-Ring Model (Koh & Balthazard, 1997). Readiness for e-government (EGOV) is an outcome construct in the study. It is assumed that both ITG and IS-ALIGN will have an impact on EGOV directly; ISA might have an impact on EGOV directly or indirectly. From the instrument of EGOV, the study anticipates workable principles to assist the transformation of government from an industrial age to the information age.

Domains of Digital Government

Dawes, Bloniarz, and Kelly (1999) point out that policy, management and technology of the current government march to different drummers. Most departments are still organized for physical limitations of the information age. They continue to rely on specialization of control management structures. Public policies lag behind the technological evolution. Also, it has been observed that the pace of technology responds to the forces of scientific inquiry and innovation. The interaction of these three domains (i.e., policy, management, and technology) generates an important societal debate because what is technically achievable may not be organizationally feasible or socially or politically desirable. Figure 11 represents the domains of digital government.

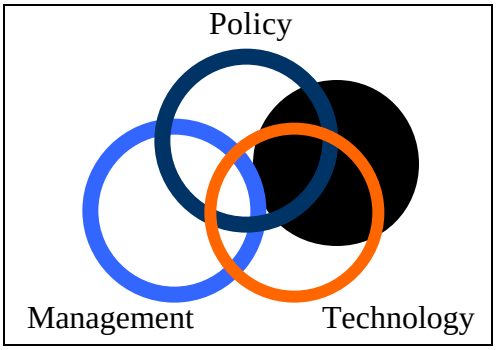


Figure 11. Domains of digital government (Dawes, Bloniarz, & Kelly, 1999).

Organizational change reflects the ability of humans to recognize and adapt to changes in their environment (Dawes, Bloniarz, & Kelly, 1999). This slower process of the organizational change is especially difficult in the government as it is bound by civil service systems, one-year budget cycles, and rules and procedures cast in both statute and regulation. Public policies change only when there is a broad consensus that change is needed and will move the nation, community, or society in a desirable direction. Meeting the goals of e-government requires research that spans policy, management, and technology domains. Therefore, the following section will introduce Gartner's Four Phases of E-government Model (i.e., the presence, interaction, transaction, and transformation phases) that was invented by Baum and Di Maio (2000).

Gartner's Four Phases of E-government Model

Gartner's Four Phases of E-government model (Baum & Di Maio, 2000) can serve as a reference to a position where a project fits in the overall evolution of an e-government strategy. One of the issues facing governments is how to measure progress for e-government initiatives and to achieve the desired levels of constituency service. The four phases are:

1. Presence: This initial phase of e-government development is characterized by the land rush to simply have a cyberspace placeholder on the Internet. The primary goal is to post information such as agency mission, addresses, opening hours and possibly some official documents of relevance to the public.

2. Interaction: This phase is characterized by Web sites that provide basic search capabilities, host forms to download, and linkages with other relevant sites, as well as e-mail addresses of offices or officials. This stage enables the public to access critical information online and receive forms that may have previously required a visit to a government office.

3. Transaction: This phase is characterized by allowing constituents to conduct and complete entire tasks online. The focus of this stage is to build self-service applications for the public to access online, but also to use the Web as a complement to other delivery channels. Typical services that are migrated to this stage of development include tax filing and payment, driver's license renewal, and payment of fines, permits and licenses. Additionally, many governments put requests for proposals and bidding regulations online as a precursor to e-procurement. This is the current stage for several agencies and the most immediate target for many e-government initiatives worldwide.

4. Transformation: This phase is the long-term goal of almost all-national and local e-government initiatives. It is characterized by redefining the delivery of government services by providing a single point of contact to constituents that makes government organization totally transparent to citizens. This phase relies on robust customer relationship management tools and new methods of alternative service delivery capabilities that reshape relationships between citizens, businesses and governments.

It is not necessary that every department or government go through all four phases. A savvy government could skip to Interaction or even Transaction without going through the other phases. It is unlikely, however, that any bureaucracy will jump right to Transformation. Moreover, a department can run multiple sites in different phases of development. For example, a city's property tax department might be well into the Transaction phase and accepting credit card payments over the Internet, while its utility department has a Web site that only gives office locations and hours.

The final stage of transformation is the stage of achieving Internet effective usage. It enhances the ability of constituents to participate more directly in government activities (e.g., e-referendums and e-voting). Examples of transformation include highly tailored Web sites, or virtual agencies, where government information is pushed to citizens, and where they can pay local property taxes, renew state driver's licenses and apply for federal passports all in one place, with seamless interfaces back to the respective agencies involved in the transactions. This phase will also include the development of state-of-the-art intranets that can link government employees who work in different agencies. Governmental transformation will also include the design of extranets that allow the seamless flow of information and collaborative decision-making among federal, state and local government agencies; private and not-for-profit sector partners; and the public. The Three-Ring Model (Koh & Balthazard, 1997) has similar processes and is introduced in the next section.

Three-Ring Model

Koh and Balthazard (1997) propose that organizations use the Internet primarily for one or more of the three different reasons: To disseminate information for

informational use, to sell goods and services for transactional use, and to support business operations for operational use. Figure 12 presents the Three-Ring Model of Internet use in organization. The three different Internet usages will be described as follows.

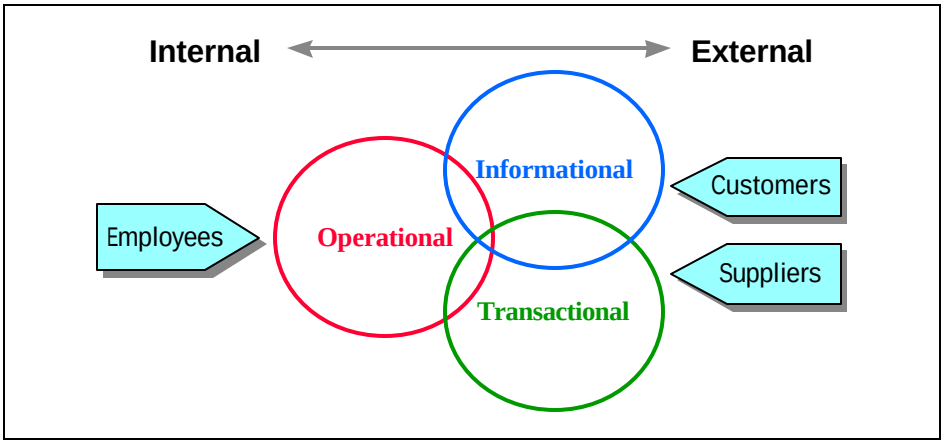


Figure 12. Three-Ring Model of Internet use in organization (Koh & Balthazard, 1997).

1. Informational use: Organizations use the Internet to disseminate information to educate, entertain, influence, or reach the consumer. For instance, a retailer may use the Internet to publish consumer information about a product or service. This informational use of the Internet is the earliest application of the technology and for many organizations this is still the most predominant form of Internet application.

2. Transactional use: Today many organizations use the Internet to support a coordinated sequence of user and system activities that ultimately results in the transfer of value. This transactional nature of Internet applications has brought about numerous critical issues to the surface, most notably security.

3. Operational use: The Internet offers companies new mechanisms for conducting business operations by integrating computing power, human intellect, and other resources into synergistic networks.

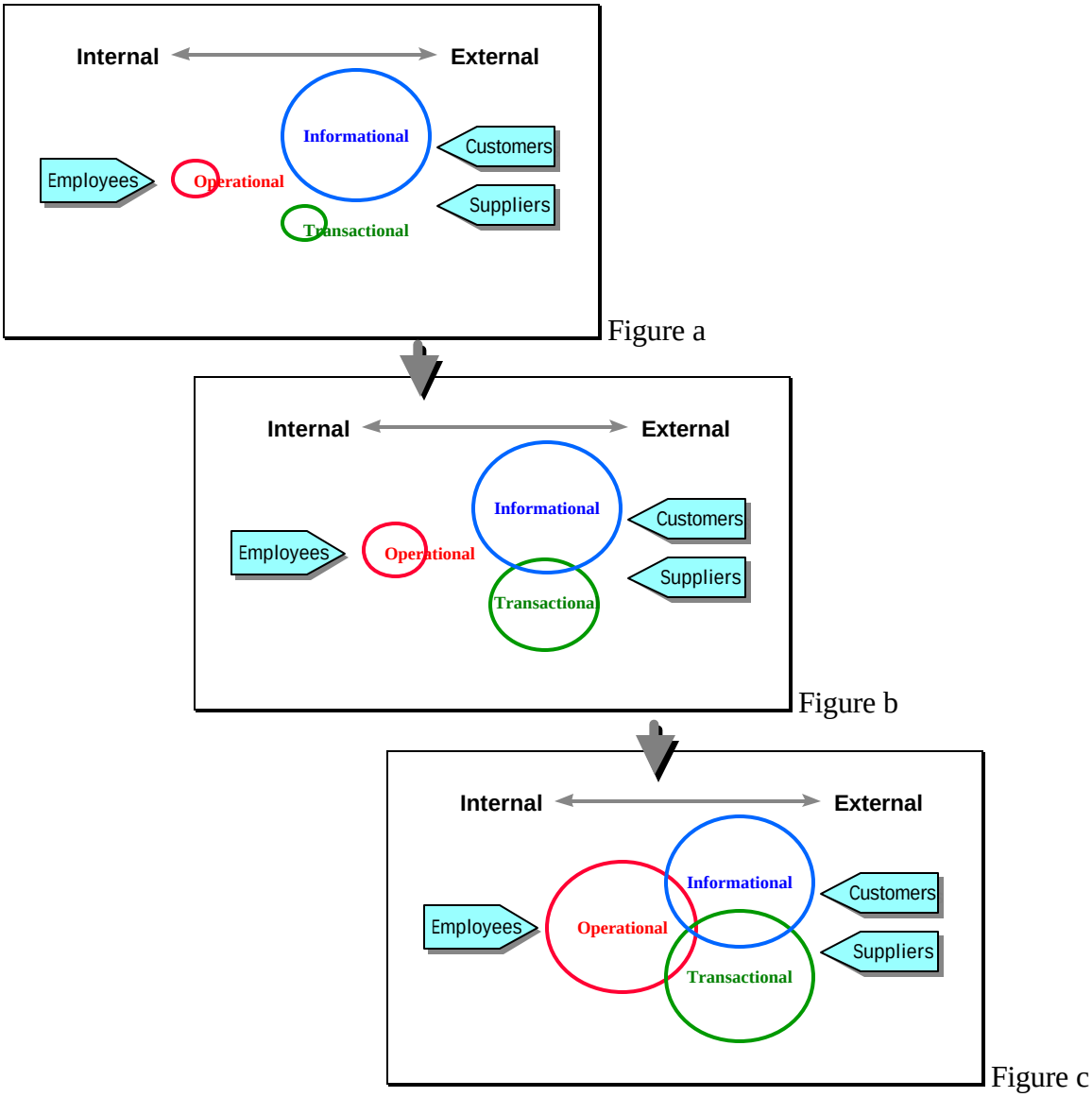


Figure 13. Evolutional path of organizational Internet use (Koh & Balthazard, 1997).

Organizations follow an evolutionary path in the way they use the Internet as shown in Figure 13, individually or collectively. In the earliest stage, an organization uses the Internet primarily for informational purposes because it is relatively simple and inexpensive to do, and the organization perceives a quick and large return on investment (see Figure a). As organizations become more familiar with the technology, they expand their Internet applications to sell products or provide services (see Figure b). At this

point, integrating Internet applications with existing applications and databases become inevitable. Eventually organizations realize that the Internet is more than a technology for communication and exchange of data over the networks. The Internet eventually becomes a platform on which all applications are integrated and coordinated. This is why many believe that “intranets” are one of the most important technologies that may reshape the organizational IS. In the final stage, all Internet applications are tightly integrated into a cohesive business agent (see Figure c).

No one would question the importance and value of integrating and coordinating diverse Internet initiatives. This would require conscious and concerted effort in planning designing and implementing applications at all levels of organization. The Three-level Internet integration strategy is shown in Figure 14. Three such levels are identified and studied:

1. Planning level: Internet strategies are devised in alignment with organizational strategies and plans including business planning (BP) and Internet planning (IP).

2. System level: Design, development, and deployment of applications are planned and coordinated.

3. Data level: Data needs for all Internet applications are recognized, coordinated, and supported.

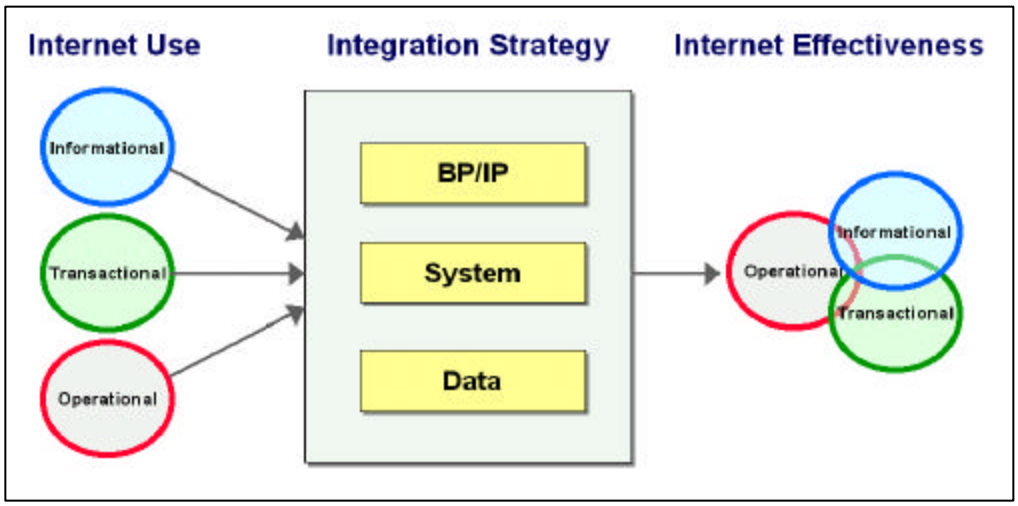


Figure 14. Three-level Internet integration strategy (Koh & Balthazard, 1997).

Summary: Potential E-government Readiness Model

In summary, ISA consists of the IS-SUCCESS and IS-SERVQUAL instruments in the role of driver and IT use, ITG and IS-ALIGN in the role of moderator and integration strategies, and EGOV in the role of outcome and IT effectiveness in Table 4 below which corresponds to the Three-level Internet Integration Strategy Model (Koh & Balthazard, 1997). Based on DeLone and McLean's (1992) IS Success Model, IS affects organizational impact directly and indirectly; thus, the causal relationship between ISA and EGOV is explicitly formed in the potential e-government readiness model. Moreover, Myers, Kappelman, and Prybutok (1998) in their Comprehensive IS Assessment model also point out the importance of the IS assessment model within the context of the organization and the external environment. The organization environment is marked by organizational goals, tasks, structure, volatility, and management philosophy which all impact IS assessment. ITG and IS-ALIGN are included into the organization environment because ITG stresses to control business objectives for IT, and IS-ALIGN stresses the relationship between business structure and IT.

Table 4

Summary of Instruments and Roles of ISA, ITG, IS-ALIGN, and EGOV

Instruments	Dimensions	Roles
IS-SUCCESS	System quality	Driver: IT Use
	Information quality	
	Use	
	User satisfaction	
	Individual impact	
	Organizational impact	
IS-SERVQUAL	Reliability	Driver: IT Use
	Competence	
	Responsiveness	
	Timeliness	
	Communications	
	Training	
	Empathy	
	Attitude/Commitment to user involvement	
	Relationships	
	Access	
ITG	Planning and organization	Moderator: Integration Strategy
	Acquisition and implementation	
	Delivery and support	
	Monitoring	
IS-ALIGN	Leadership	Moderator: Integration Strategy
	Strategic Planning	
	Customer and Market Focus	
	Information and Analysis	
	Human Resource Focus	
EGOV	Planning or strategic stage	Outcome: IT Effectiveness
	System stage	
	Data stage	

Therefore, these causal relationships, which ITG impacts ISA, and IS-ALIGN impacts ISA, are formed explicitly in the potential e-government model. In turn, the organization environment also brings in organizational impact eventually. The causal relationships, which ITG impacts EGOV, IS-ALIGN impacts EGOV, and IS-ALIGN impacts ITG as well as the reverse being true, are formed explicitly in the model. Thus, the e-government readiness model allows an exploration of the relationships among IS structure (DeLone and McLean's IS Success model, and IS-SERVQUAL), organizational structure (ITG

and IS-ALIGN) and readiness for e-government (EGOV). Furthermore, Figure 14 graphically captures the essence of this study. Using the relationship of the three-level Internet integration model, this study builds the potential e-government readiness model displayed in the following Figure 15.

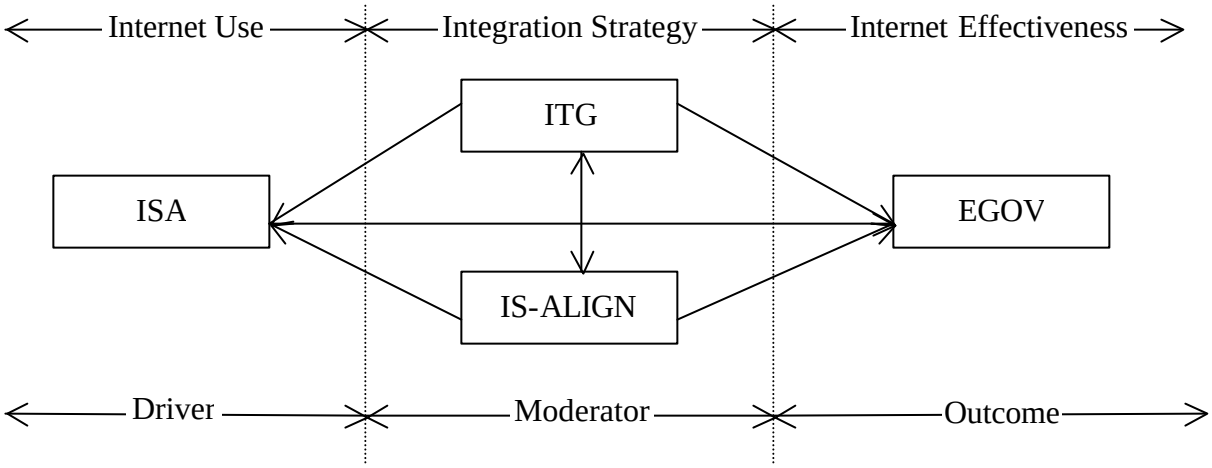


Figure 15. Potential e-government readiness model.

CHAPTER 3

METHODOLOGY

Introduction

This chapter presents the research instruments and methodology used in the current study. Construction of specific instruments and measures of appropriate constructs are presented. The constructs of IS structure (ISA) and organizational structure (ITG and IS-ALIGN) are used as independent constructs. ITG and IS-ALIGN also are moderating constructs in the study. The readiness construct of e-government (EGOV) is a dependent construct. Most constructs used in this study have not been validated before. As such, the measurement analysis section emphasizes explanations of the reliability and validity of the new instruments for measuring these constructs, and the data analysis via structural equation modeling (SEM) is equally concerned with assessing the proposed measurement relations (i.e., through confirmatory factor analysis) and the proposed structural relations (i.e., through path analysis). The true power of SEM is the ability to estimate a complete model incorporating both measurement and structural considerations (Kelloway, 1998).

The main objective of the research is to develop effective assessment measures of e-government readiness in an organization-wide and IS specific perspective. It is essential to test whether instruments developed to measure ISA, ITG, IS-ALIGN, and EGOV can be used to measure the readiness for e-government. It is also necessary to test the relationships among the different instruments (ITG, IS-ALIGN, and ISA) and their relationship to the readiness for e-government (EGOV). The final goal of the research is to develop a set of guidelines to assist government in transforming itself to better utilizing

IT. In order to accomplish this, new instruments developed for measuring ISA, ITG, IS-ALIGN and EGOV are combined into a Web-based survey that is performed in the study. The Web-based survey of the City of Denton (COD) employees was conducted by a research team from the University of North Texas (UNT) about how IT relates to organizational performance. There are three main parts (A, B, and C) to the survey. The current study utilizes most of the survey except Part A-2 and A-3. The structure of the COD instruments is shown in Table 5.

Table 5

Structure of the COD Instruments

Contents	Parts	Questions	Total questions	Related questions in the study
Cover Letter				
Terms and Definition				
Demographics	A-1	1-12	12	12
MBNQA	A-2	1-36	71	-
	A-3	37-71		
IS-SERVQUAL	B-1	1-28	54	54
	B-2	29-54		
IS-SUCCESS	B-3	1-16	16	16
ITG		17-27	11	11
EGOV	C-1	1-38	38	-
	C-2	39-51	13	13
	C-2	52-63	12	-
IS-ALIGN	C-3	1-20	20	20
Total			247	126

Information Systems Assessment (ISA) Instrument

Instrument of DeLone and McLean's IS Success Model

DeLone and McLean's (1992) comprehensive review of the literature represents an important step towards consolidating the knowledge of IS success measures. In their model, system quality and information quality both influence use and user satisfaction, which in turn influence the impact of the system on the individual user and the

organization. They proposed such interrelationships among the dimensions in their model; but they did not empirically test them. Since 1992, a number of studies explicitly tested the associations among the measures identified in the IS Success Model (Etezadi-Amoli & Farhoomand, 1996; Goodhue & Thompson, 1995; Guimaraes & Igbaria, 1997; Igbaria & Tan, 1997; Jurison, 1996; Seddon & Kiew, 1994; Teo & Wong, 1998). Some empirical studies have implicitly tested the model by investigating multiple success dimensions and their interrelationships (Gelderman, 1998; Igbaria & Tan, 1997; Teng & Calhoun, 1996).

The current study selects measured items and develops a new instrument that uses DeLone and McLean's study (1992) as the basis of the ISA instrument developed by Kappeman, and Chong (2001) on the COD project. It is necessary to have further validation of these measurements. The items reflect aspects of the measurements in the following:

1. System quality, which consists of reliability, ease of use, accessibility, usefulness, and flexibility.

2. Information quality, which includes content, availability, accuracy, timeliness, conciseness, and convenience.

3. Use, which refers to how many hours per week for IT usage.

4. User satisfaction, which refers to overall satisfaction from the IT.

5. Individual impact, which refers to overall positive impact of individual performance by the aid of IT.

6. Organization impact, which refers to overall positive impact of the organizational performance by the aid of IT.

These items pertaining to the DeLone and McLean's IS Success Model are mapped to six dimensions as shown in Table 6, where the item numbers correspond to items in Part B-3 of the Web-based survey, except the Use dimension which is located in Part A-1. Table 6 represents the instrument of the IS Success Model adapted from DeLone and McLean's Study (1992). Respondents were asked to rate the extent to which the performance of the technology service department's staff meets their expectations by selecting a number ranging from 1 (i.e., far short of expectations) to 7 (i.e., greatly exceeds expectations).

Table 6

Dimensions of IS-SUCCESS: Total 16 items

Dimensions	Parts	Item Numbers
System quality	B-3	Items 1-6
Information quality	B-3	Items 7-13
Use	A-1	Items 2, 5, 8
User satisfaction	B-3	Items 14
Individual impact	B-3	Items 15
Organizational impact	B-3	Items 16

IS-SERVQUAL Instrument

The instrument, IS-SERVQUAL, developed by Van Dyke, Kappelman, and Prybutok (1997) was selected for use in this study because it addresses a number of problems with the SERVQUAL instrument that are discussed in the literature (Babakus & Boller, 1992; Carman, 1990; Cronin & Taylor, 1992; Kettinger & Lee, 1997; Van Dyke, Kappelman, & Prybutok, 1997). The items pertaining to IS-SERVQUAL are mapped to 10 service quality dimensions as shown in Table 7, where the item numbers correspond to items in Part B-1 and B-2 of the Web-based survey. Respondents are asked to rate the extent to which the performance of the Technology Services Department's staff

meets their expectations by selecting a number ranging from 1 (i.e., far short of expectations) to 7 (i.e., greatly exceeds expectations).

Table 7

Dimensions of IS-SERVQUAL: Total 54 items

Dimensions	Parts	Item Numbers
Reliability	B-1	Items 1-5
Competence	B-1	Items 6-11
Responsiveness	B-1	Items 12-17
Timeliness	B-1	Items 18-22
Communications	B-1	Items 23-28
Training	B-2	Items 29-33
Empathy	B-2	Items 34-39
Attitude/Commitment to user involvement	B-2	Items 40-44
Relationships	B-2	Items 45-49
Access	B-2	Items 50-54

IT Governance (ITG) Instrument

The ITG instrument examines the policies, procedures, and processes by which IT decisions are made, including how organizational priorities are set, how resources are allocated, and how technical issues concerning compatibility, standards, and architecture are resolved. The instrument also shows how city employees view various issues related to IT effectiveness. The instrument in this study was developed by Sanchez and Kappelman (2001) for the COD project. According to the framework of ITG in Chapter 2, the ITG dimensions consist of planning and organization, acquisition and implementation, delivery and support, and monitoring, all of which correspond to the goals of the COD project. The ITG assessment is based, at least in part, upon the following goals of the COD project: (1) An examination of the types and degrees of alignments among the technical and social subsystems of City operations; (2) an examination of the policies, procedures, and processes by which IT decisions are made,

including how organizational priorities are set, how resources are allocated, and how technical issues concerning compatibility, standards, and architecture are resolved. These items pertaining to ITG are mapped to four dimensions and the goals of the COD project as shown in Table 8, where the item numbers correspond to items in Part B-3 of the Web-based survey. Respondents were asked to respond to each item of the ITG instrument using a scale from 1 (strongly disagree) to 7 (strongly agree).

Table 8

Items of ITG to Dimension Map: Total 11 items

Dimensions	COD Project's Goals	Part	Item Number
Planning & organization	Goal 2	B-3	Items 17-21
Acquisition & implementation	Goal 1 & 2	B-3	Items 23- 26
Delivery & support	Goal 2	B-3	Items 27
Monitoring	Goal 2	B-3	Items 22

Organization-IS Alignment (IS-ALIGN) Instrument

The IS-ALIGN instrument examines how effectively the City utilizes IT to support various business objectives. Twenty different business objectives that are aligned with the use of IT are presented. The questions also ask how important each objective is to the City using a scale from 1 to 7. The instrument was developed by Sanchez and Kappelman (2001) for the COD project based on the MBNQA instrument, where the item numbers correspond to items in Part A-2 of the Web-based survey. The IS-ALIGN instrument asks questions about organization-IS alignment that will allow confirming the relationships that are pursued via the MBNQA model. The core values and concepts of the MBNQA are embodied in seven categories such as Leadership, Strategic Planning, Customer and Market Focus, Information and Analysis, Human Resource Focus, Process Management, and Business Results (See Figure 10 in Chapter 2), but the current study

only includes the first five items. These items pertaining to IS-ALIGN are mapped to five dimensions as shown in Table 9, where the item numbers correspond to items in Part C-3 of the Web-based survey. Respondents were asked to respond to each item using a scale from 1 (strongly disagree) to 7 (strongly agree).

Table 9

Items of IS-ALIGN to Dimension Map: Total 20 items

Dimensions	Parts	Item Numbers
Leadership	C-3	Items 1, 2, 3, 5, 6, 7, 8, 9
Strategic planning	C-3	Items 4, 10, 11, 12, 13
Customer & market focus	C-3	Items 14, 15, 16
Information & analysis	C-3	Items 17, 18, 19
Human resource	C-3	Item 20

E-government Readiness (EGOV) Instrument

The EGOV instrument was adapted from the study of the Action-Audience Model developed by Koh & Balthazrd (1997). Their study was conducted with 82 companies with a Web presence in 1996. There are three sections in the original EGOV instrument: E-government functions, e-government readiness, and barriers to e-government. E-government readiness is represented in the second section, where the item numbers correspond to items in Part C-2 from items 39 to 51 in the Web-based survey.

The City's readiness for e-government is assessed at three levels: (1) Planning or strategic level, (2) system or application level, and (3) data level. At the planning or strategic level, an organization prepares for e-government by devising enterprise-wide e-government strategies in line with business strategies and plans. At the system or application level, it must ensure that the design, development, and deployment of all e-government functions are carefully planned and coordinated. Finally, at the data level of

e-government, the organization must establish an effective data infrastructure to support and coordinate diverse e-government functions. The survey asks employees how well they believe the City is prepared to usher in e-government in terms of various success factors at three levels. Items 39 to 42 correspond to the planning level, items 43 to 46 correspond to the system level, and items 47 to 51 correspond to the data level. The last two questions will be omitted when performing factor analysis because the two questions are not related to e-government readiness. Table 10 lists the items of EGOV related to dimension map. Respondents were asked to rate by using a scale from 1 (strongly disagree) to 7 (strongly agree).

Table 10

Items of EGOV to Dimension Map: Total 13 items

Dimensions	Parts	Item Numbers
Planning level	C-2	Items 39-42
System level	C-2	Items 43-46
Data level	C-2	Items 47-51

Survey Method and Subjects

The research team of University of North Texas (UNT) developed a survey instrument based on the research frameworks as discussed in the conceptual foundation section of Chapter 2 as well as feedback from the interviews and focus groups. A team of doctoral students and faculty worked on the City of Denton (COD) project during the spring semester of 2001. The doctoral students worked under the direction of the directors and their faculty colleagues. Both qualitative and quantitative data were collected and analyzed. The primary quantitative data collection was done by means of a Web-based questionnaire delivered over the Internet. In order to custom tailor the

research model and the selection of questionnaire questions to the situation in the City of Denton, as well as to collect other qualitative data, a series of focus groups were held prior to and during the final selection of assessment instruments. The role of the focus group in the study also was a vehicle to increase the response rate of the survey.

The proposal titled "Assessing Socio-Technical Alignment for the City of Denton" was approved by the Institutional Review Board of University of North Texas (UNT), Denton, Texas on March 27, 2001. A cover letter signed by the director of Information System Research Center (ISRC), Dr. Leon A. Kappelman, the director of Center for Quality and Productivity, Dr. Victor R. Prybutok, and the director of Center for the Study of Work Teams (CSWT), Dr. Michael Beyerlein, was attached to the Web-based survey. A copy of the survey's cover letter and the complete instrument are shown in Appendix A.

The survey was prepared in multiple pages so that an employee could take as many or as few pages as they desired at a time. There are three main parts to the survey, so the respondents needed to dedicate approximately three 1-hour sessions of work time (or maybe time at home) to complete the survey. If the respondents had no access to a computer at work, their supervisor made arrangements for them. A unique access code was assigned to each employee for security and tracking purposes. The Web server kept track of the progress and guided the employee through the survey. A missing value was not allowed by showing a warning message via a popup window. Duplicates from the same participants were also not allowed in order to maintain quality responses.

The initial e-mail message was sent by the research team to announce the survey and provided the user access code, two more follow-up messages were sent at one-week

intervals to encourage participation of those employees who had not completed the survey. To ensure a good response rate and quality responses, the City Council, City Manager, and senior management of the City, even the teams of focus groups, actively and visibly requested the cooperation of all participating employees. The City Manager sent out two letters to all employees in which he announced the survey and encouraged their participation in April. In the letters, he also explained the purpose of the survey and the voluntary nature of the study.

Respondents were notified that the survey runs on the university's computers and the UNT research team would analyze the data and share only summaries to help the City of Denton enhance its ability to utilize IT, improve operational performance, and get ready for digital government. Respondents were told that their participation in this study was voluntary, not required, and their refusal to participate would not adversely affect them in any way. In addition, respondents could withdraw from this study at any time; although, once they participated their contributions could not be taken back. Participation in this study did not require them to reveal any personal information, aside from some demographics about things like education and the IT's that respondents use at work.

Based on the study of McCall (1982), a population of 1,000 users requires a sample size of 278 to provide a confidence level of 95% with an acceptable error of 0.05. The population of this survey is approximately 1,100 employees of the City of Denton. The data collection was scheduled for a period of five weeks. The response rate of the study was expected to be approximately 30%.

Procedure for Analysis

The readiness for e-government instrument in the study was evaluated for reliability, validity, and model fit. The validity and reliability measures discussed in this section indicate that the instrument has the potential for use in further adoption studies. The SEM deals directly with how well the measures reflect the intended constructs.

Reliability

Reliability refers to the property of a measurement instrument that causes it to give similar results for similar inputs. In its everyday sense, reliability is the consistency or repeatability of the measures (Kerlinger, 1986). Cronbach's alpha is commonly used to assess reliability. In general, Cronbach's alpha is used in the initial analysis in order to compare results with previous studies that used Cronbach's alpha to test reliability. However, Cronbach's alpha is not considered the appropriate measure of reliability for a difference score (Van Dyke, Kappelman, & Prybutok, 1997), so a modified alpha formula recommended for use by Stanley (1967) and Johns (1981) is also used to test reliability. The method exhibiting the highest alpha values is considered to be the most reliable. Alpha scores are calculated for both of the overall scales, to measure the internal consistency of the items within the entire scale, and for each dimension to measure the internal consistency of the items within each dimension. Since no difference scores are calculated on the readiness for e-government instrument, John's alpha is not used.

Construct Validity

Construct validity is established by showing that the instrument measures the construct it is intended to measure. Construct validity is evaluated by performing correlation and factor analysis. Construct validity of the readiness for e-government

instrument was assessed in two ways. First, correlations between overall EGOV and each measure relating to ISA, ITG and IS-ALIGN were examined. High correlations are considered to indicate construct validity. Second, factor analysis was conducted on the different measures of readiness for e-government to determine if they loaded onto the factors as theorized by Magal (1991) and Seddon and Kiew (1994).

Convergent Validity

Construct validity is further evaluated by following guidelines for measuring convergence and discrimination proposed by Bagozzi (1981). Bagozzi suggested that correlations for items within a dimension should be high, and that correlations for items across dimensions should be lower than the correlations within dimensions. Convergent validity was assessed by measuring the extent that items correlated with other items in the same factor or dimension. High correlations among items within each factor are considered to indicate convergent validity. Convergent validity refers to how well different scales of items indicate the same or similar constructs, and how well multiple measures of the same construct agree with each other (Kerlinger, 1986).

Discriminant Validity

Discriminant validity refers to how well scale items differentiate between separate constructs (Kerlinger, 1986). Discriminant validity was assessed by counting the number of times an item had a higher correlation with an item from another factor or dimension than with items in its own factor. A count of less than half the total potential comparisons is considered to indicate discriminant validity, according to Campbell and Fiske (1959). This study contains 126 questions, so counting the numbers of times

(approximately 8,000 times) would have been time-consuming. This study omitted the discriminant validity tests.

Content validity

Content validity is indicated by internal consistency and correlations of measures with other measures of the construct (Kerlinger, 1986). High item-total correlations, along with high correlations of each measure with an overall measure of EGOV are considered to indicate content validity. Content validity is assessed by examining item-total correlations and by examining correlations of the readiness for e-government measures with an overall measure of EGOV. If items on the readiness for e-government instrument displayed a high correlation with an overall rating of EGOV, it is considered to indicate content validity.

Structural Equation Modeling (SEM)

Structural equation models are models of relationships among constructs that encompass and extend regression and factor analysis procedures (Hayduk, 1987; Bollen, 1989). Mertler and Vannatta (2001) define structural equation modeling (SEM) as a sophisticated version of path analysis incorporating unobservable, un-measurable (latent) constructs into the path model. Why was SEM selected for the data analysis in this study? There are at least three main reasons based on Kelloway's suggestions. First, this study uses measures to represent constructs because this research has a corresponding interest in measurement and measurement techniques. SEM casts factor analysis in the tradition of hypothesis testing, with explicit tests of both of the overall quality of the factor solution and specific parameters (e.g., factor loadings) composing the model. SEM deals directly with how well the measures reflect the intended constructs.

Second, aside from questions of measurement, this study is principally interested with questions concerning the relationships among the measures. SEM techniques allow for the specification and testing of complex path models that incorporate this sophisticated understanding. The focus of this study is on the mediational relationships (rather than simple bivariate prediction) and the causal processes that give rise to the phenomena of interest. Third or finally, and perhaps most important, SEM provides a unique analysis that simultaneously considers questions of both measurement and prediction. Typically referred to as latent construct models, this form of SEM provides a flexible and powerful means of simultaneously assessing the quality of measurement and examining predictive relationships among constructs. Thus, Cliff (1983) referred to the advent of SEM techniques as a statistical revolution.

LISREL. Although social researchers have long been accustomed to seeing the phrase "data were analyzed with LISREL" appear in their research literature, technically there is no such thing as a LISREL analysis (Kelloway, 1998). LISREL is an acronym for LInear Structural RELations model. Properly speaking, LISREL is a computer program that analyzes covariance structures, but the widespread use of the LISREL software has identified the name of the program with the statistical procedures it performs. It is considered the most general method for the analysis of causal hypotheses or covariance structure models on the basis of non-experimental data. LISREL for Windows (v. 8.30) invented by Scientific Software International (Chicago, Illinois, 1999) is used in this study. The study uses the LISREL software to carry out exploratory and confirmatory factor analysis, as well as path analysis.

There are two basic types of variables in LISREL. The latent variables are represented by ovals and the observable variables by rectangles in Figure 16. Latent variables are those that are formulated in terms of theoretical or hypothetical concepts, or constructs that are not directly measurable or observable. Observable variables are those that are directly measurable or observable and can be used as indicators of latent variables. In other words, latent variables are represented or measured by observable variables.

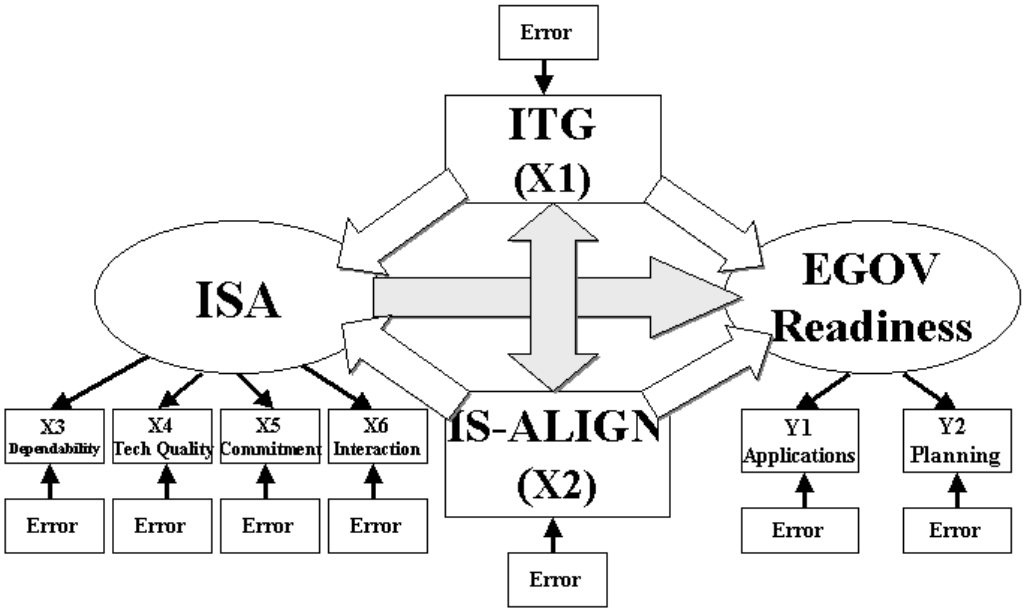


Figure 16. The hypothetical e-government readiness model

Figure 16 demonstrates a hypothetical e-government readiness model. In Figure 16, constructs on the right side are dependent constructs, e.g., EGOV is the dependent latent construct, and applications and planning are the dependent observable variables. Constructs on the left side are independent constructs (e.g., ISA, ITG, and IS-ALIGN). LISREL integrates both latent theoretical concepts and observed or measured variables into a single structural equation to measure the causal relationship among the constructs.

This hypothetical model in Figure 16 states that EGOV is impacted by ITG, IS-ALIGN and ISA. Each of these is a latent construct, which is measured by one or more observable variables. For example, the latent construct EGOV can be measured by applications and planning. Note that each observed variable is also caused by a second latent construct representing the residual or measurement error. Each of the latent constructs is allowed to correlate with the other latent constructs.

Single arrows represent a causal impact of one construct upon another, with the head of the arrow pointing towards the constructs being influenced by the second construct. Bi-directional arrows refer to correlated or bi-directional relationships. Lines pointing from independent latent constructs to dependent latent constructs are called paths. In addition, no manifest measurement or any other latent construct is one hundred percent perfect; there is always measurement error to consider. Measurement error for each construct is represented by the single arrows pointed towards the construct, but with no corresponding construct at the other end of the arrow exerting a causal influence. In these cases, such as the relationship between the errors of X3 and X4, no statements about causality are being made; only a relationship is discussed.

Constructs which are at the top or left portion of the model and which exert a causal impact on other constructs are said to be exogenous or upstream variables. By contrast, constructs that are influenced by other constructs are said to be endogenous or downstream construct. Exogenous constructs offer the explanation or prediction; endogenous constructs are explained or predicted by the research. Endogenous constructs may serve as both predictors and criteria, being predicted by exogenous constructs and predicting other endogenous constructs. A model, then, is a set of theoretical propositions

that link the exogenous constructs to the endogenous constructs and the endogenous constructs to one another.

Once data are collected on all the observable variables, LISREL will estimate the path coefficients that indicate the magnitude of the contribution of each independent latent construct to the dependent latent construct. That is, path coefficients are used to assess the impact of e-government readiness when the contributions of other factors (e.g., ITG, IS-ALIGN, and ISA) are considered together. LISREL will also report whether the path coefficient is statistically significant or not. With reference to Figure 16, the general principle is that if the theory is correct, then direct and proximal relationships should be stronger than more distal relationships. Correspondingly, if the theory is correct, the model should have strong correlations between ISA and EGOV, ITG and ISA, ITG and EGOV, IS-ALIGN and ISA, IS-ALIGN and EGOV, and IS-ALIGN and ITG.

Note that a theory is defined as an explanation of why constructs are correlated and the description of hypotheses about causal relations (Kelloway, 1998). A necessary but insufficient condition for the validity of a theory would be that the relationships (i.e., correlations/covariances) among variables are consistent with the propositions of the theory. LISREL requires the input of a correlation or covariance matrix. The covariance matrix for the 8 input variables (i.e., X1-X6 and Y1-Y2) is used in the study as input to perform a maximum likelihood linear structural relation analysis.

The LISREL methodology involves a number of steps (Tague-Sutcliffe, Vaughan, & Sylvain, 1996): (1) Identifying variables to be used, (2) collecting data on these variables, (3) developing the model, (4) testing the model against the data, and (5) revising the model if necessary and retesting it. Variables identified in the study will be

discussed in detail later in the section on exploratory factor analysis (EFA) in Chapter 5. Data for these variables were collected through the use of an on-line survey. Developing, testing, and revising the model will be discussed in detail later in the section of the confirmatory factor analysis (CFA) in Chapter 5. CFA is performed on each instrument to establish validity of the model.

Exploratory factor analysis (EFA). EFA is used to explore the empirical data, to discover and detect characteristic features and interesting relationships without imposing any definite model on the data. An exploratory analysis may be structure generating, model generating, or hypothesis generating. In general, EFA is guided by intuitive and ad hoc rules (Kelloway, 1998). The goal of EFA is to describe and summarize data by grouping together variables that are correlated. Some of the variables included in the analysis have not been chosen with these underlying structures in mind. EFA proves useful for consolidation of numerous variables. This study will perform factor analysis and identify variables by using SPSS version 9.0 for Windows.

Confirmatory factor analysis (CFA). The major objective of CFA is to empirically validate the hypothesized model and to confirm or disconfirm some a prior theory. The CFA estimates the parameters of the hypothesized model with a sample covariance matrix and determines the fit of the hypothesized model. This process is to determine how close the estimated covariance matrix is to the sample covariance matrix. The closer the two, the better the fit identified between the sample and hypothesized model. A good fit indicates the sample data support the hypothesized model. The results of the analysis are examined to determine the degree of fit of the model and several indicators are examined to evaluate the model's goodness of fit.

Bollen and Long (1993) describe the five stages characteristic of most applications of SEM: (1) Model specification, (2) identification, (3) estimation, (4) testing fit, and (5) respecification. In developing and conducting the CFA of this study, Bollen and Long's (1993) description of SEM is as follows.

1. Model specification. SEM is inherently a confirmatory technique, the methods of SEM are ill suited for the exploratory identification of relationships (Kelloway, 1998). Rather, the foremost requirement for any form of SEM is the a prior specification of a model. The purpose of the model is to explain why variables are correlated in particular fashion. Bollen (1989) presents the fundamental hypothesis for SEM as ? = ?(?) where ? is the observed population covariance matrix, ? is a vector of model parameters, and ?(?) is the covariance matrix implied by the model. When the equality expressed in the equation holds, the model is said to "fit" the data (Kelloway, 1998). The goal of SEM is to explain the patterns of covariance observed among the study variables.

Most frequently, the structural relations that form the model are depicted in a path diagram in which constructs are linked by unidirectional arrows (representing causal relations) or bi-directional curved arrows (representing noncausal, correlational, or relationships). In general, the best path diagram should be the most parsimonious diagram that fully explains why constructs are correlated and can be justified on theoretical grounds (Kelloway, 1998). Path diagrams are most useful in depicting the hypothesized relations because there is a set of rules, initially developed by Wright (1934), which allow one to translate the diagram into a series of structural equations by writing a set of equations that completely define the observed correlations matrix. The set of arrows constituting the path diagram include both simple and compound paths. A simple path

represents the direct relationship between two variables (i.e., the regression of Y on X). A compound path consists of two or more simple paths. The value of a compound path is the product of all the simple paths constituting the compound path. The correlation between any two constructs is the sum of the simple and compound paths linking the two constructs.

2. Identification. Application of SEM techniques involves the estimation of unknown parameters (e.g., factor loadings or path coefficients) based on observed covariances/correlations (Kelloway, 1998). In general, issues of identification deal with whether a unique solution or its component parameters for the model can be obtained (Bollen, 1989). Models or parameters may be underidentified (i.e., the number of unknowns exceeds the number of equations), just-identified (i.e., the number of unknowns exactly equals the number of equations), or overidentified (i.e., the number of equations exceeds the number of unknowns). If the model is underidentified, no solution is possible. If the model is just-identified, then there is one set of values that completely fit the observed correlation matrix. That matrix, however, also contains many sources of error (e.g., sampling error, measurement error). In an overidentified model, there are a number of possible solutions, and the task is to select the one that comes closest to explaining the observed data within some margin of error. Therefore, the ideal situation for social studies is to have an overidentified model.

Overidentification of SEM is achieved by placing two types of restrictions on the model parameters to be estimated: (1) Assign a direction to parameters, and (2) set some parameters to be fixed (e.g., zero indicates that path is not in the model) to a predetermined value. Bollen (1989) cites four rules for the identification of structural

models: (1) the t rule, (2) the null B rule, (3) the recursive rule, and (4) rank and order conditions. Rank and order conditions refer to the identification of nonrecursive structural models and will not be dealt with further in this study. For CFA, issues of model identification typically are dealt with by default. That is, the latent constructs or constructs are hypothesized to "cause" the observed variables. The model is recursive in that the causal flow is expected to be from the latent constructs to the observed variables (Kelloway, 1998). Bollen (1989) indicates that CFA models are identified if there are at least two indicators for each latent construct and the latent constructs are allowed to correlate, but error terms are uncorrelated.

3. Estimation. All model tests are based on the covariance matrix and use maximum likelihood (ML) estimation as implemented. LISREL solves for model parameters by a process of iterative estimation. When repeated iterations fail to minimize the fitting criterion, LISREL grinds to a halt and reports the last solution it estimated. Three common fitting criteria are ordinary least squares (OLS), generalized least squares (GLS), and maximum likelihood (ML). Each criterion attempts to minimize the differences between the predicted and observed covariance matrices. When the observed and predicted covariance matrices are exactly the same, all the above criteria will equal 0. Thus, the goal of the iterative estimation procedure is to minimize the fitting function specified by the user.

Maximum likelihood (ML) estimation is the most widely used and researchers seem to equate using LISREL with doing ML estimation (Kelloway, 1998). ML estimators are known to be consistent and asymptotically efficient in large samples

(Bollen, 1989). ML is likely attributable to the fact that the minimum fitting criterion multiplied by N-1 (where N is the number of observations) is distributed as X^2.

Moreover, although the matrices of correlation and covariance are similar, the standardization of variables in constructing a correlation matrix removes important information about the scale of measurement of individual variables from the data (Kelloway, 1998). Furthermore, the hypothesis tests available in SEM are based on the assumption that one is analyzing a covariance matrix. Thus, this study elects to analyze a covariance matrix. In addition, both of the estimation methods (e.g., ML) and tests of model fit (e.g., the X^2 test) are based on the assumption of large samples. According to Kelloway's (1998) definition of "large," a sample size of at least 200 observations would be an appropriate minimum.

The output from LISREL is divided into a number of sections: (1) the covariance matrix, (2) the maximum likelihood estimates, (3) the fit indices for the model, and (4) the R^2 values for each variable. The values of the output are indications of how well the latent constructs explain the variance in the observed variables. The model contains low X^2 and high p-value, which indicate a better fit. For each endogenous variable, LISREL calculates the R^2 value, which is interpreted exactly the same as R^2 values in regression.

4. Testing fit. The assessment of model fit is not a straightforward task. SEM has no single statistical test that best describes the strength of the model's predictions. Instead, researchers have developed a number of goodness-of-fit measures that when used in combination assesses the results from three perspectives: overall fit, comparative fit to a base model, and model parsimony. In evaluating the set of measures, some general criteria are applicable and indicate models with acceptable fit: (1) non-significant X^2 (at

least P > 0.05, perhaps 0.10 or 0.20); (2) incremental fit indices, such as Normed Fit Index (NFI), Tucker-Lewis Index (TLI), greater than 0.90; (3) Low Root Mean Square Residual (RMSR), Root Mean Square Error of Approximation (RMSEA) based on the use of correlations or covariances (values ranging from 0.05 to 0.08 are deemed acceptable) and (4) parsimony indices that portray the proposed model as more parsimonious than alternative models.

Tanaka (1993) also points out that at least two traditions in the assessment of model fit are apparent. First, the assessment of absolute fit is concerned with the ability of the model to reproduce the actual covariance matrix. Second, the assessment of comparative fit, which is further subdivided into the assessment of comparative fit and parsimonious fit, is concerned with comparing two or more competing models to assess which provides the better fit to the data (Kelloway, 1998). The assessment of parsimonious fit is based on the recognition that one can always obtain a better fitting model by estimating more parameters. Thus, the assessment of parsimonious fit is based on the idea of a trade-off of cost (i.e., loss of a degree of freedom) and benefit (i.e., increased fit). Although measures of comparative and absolute fit will always favor more complex models, measures of parsimonious fit provide a fairer basis for comparison by adjusting for the known effects of estimating more parameters.

Absolute fit. Tests of absolute fit are concerned with the ability to reproduce the correlation/covariance matrix. The development of the X^2 test statistic for SEM proceeds directly from early accounts of path analysis in which there were attempts to specify a model that reproduced the original covariance matrix (Blalock, 1964; Kelloway, 1998). A nonsignificant X^2 implies that there is no significant discrepancy between the covariance

matrix implied by the model and the population covariance matrix. Thus, a nonsignificant X^2 indicates that the model "fits" the data in that the model can reproduce the population covariance matrix. The test is distributed with degrees of freedom equal to (1/2)(q)(q+1)-(k) where q is the number of variables in the model and k is the number of estimated parameters.

There are some problems with the X^2 test in addition to the logical problem of being required to accept the null hypothesis. First, the approximation to the X^2 distribution occurs only for large samples (e.g., N ? 200). Second, just at the point where the X^2 distribution becomes a tenable assumption, the test has a great deal of power. The X^2 test is calculated as (N –1)*(the minimum of the fitting function); thus, as N increases, the value of X^2 must also increase. For a minimum fitting function of 0.5, the resulting X^2 value would be 99.5 (199*0.5=99.5) for N=200, 149.5 for N=300, and so on. This makes it highly unlikely to obtain a nonsignificant test statistic with large sample sizes. Thus, the LISREL output also includes some other indications of model fit. Some indications are used in the calculation of some fit indices such as the noncentrality parameter (NCP), estimated as X^2-df, and the 90% confidence interval for the NCP.

Although this output is presented largely for the information of the researchers, the values presented typically have no straightforward interpretation (Kelloway, 1998). Steiger (1990) points out that none of the fit indices commonly reported in the literature satisfy all these criteria, with the exception of the root mean squared error of approximation (RMSEA), which was developed by him. The current version of LISREL (LISREL 8.30) reports a number of indices of model fit, about four of which address the question of absolute fit.

(a) RMR. The simplest fit index provided by LISREL is root mean squared residual (RMR). RMR is the square root of the mean of the squared discrepancies between the implied and observed covariance matrices. The lower bound of the index is 0, and low values are taken to indicate good fit. The index, however, is sensitive to the scale of measurement of the model constructs. As a result, it is difficult to determine what a low value actually is. LISREL therefore provides the standardized RMR, which has a lower bound of 0 and an upper bound of 1. Values less than 0.05 are interpreted as indicating a good fit to the data (Kelloway, 1998).

(b) RMSEA. Similar to the RMR, the RMSEA is based on the analysis of residuals, with smaller values indicating a better fit to the data. Steiger (1990) suggests that values below 0.10 indicate a good fit to the data, and values below 0.05 a good fit to the data. Values below 0.01 indicate an outstanding fit to the data, although Steiger (1990) notes that these values rarely are obtained. In addition, the RMSEA has the important advantage of going beyond point estimates to the provision of 90% confidence intervals for the point estimate. LISREL also provides a test of the significance of the RMSEA by testing whether the value obtained is significantly different from 0.05.

(c) GFI. The goodness-of-fit index (GFI) is based on a ratio of the sum of the squared discrepancies to the observed variance. The GFI ranges from 0 to 1, with values exceeding 0.9 indicating a good fit to the data.

(d) AFGI. The adjusted goodness-of-fit index (AFGI) adjusts the GFI for degrees of freedom in the model. The AFGI also ranges from 0 to 1, with values above 0.9 indicating a good fit to the data. A discrepancy between the GFI and AGFI typically indicates the inclusion of trivial and often nonsignificant parameters.

(2) Comparative Fit. The question of comparative fit deals with whether the model under consideration is better than some competing model. In some sense, the tests for model fit in this study are based on a comparison of models. That is, indices of comparative fit typically choose as the baseline a model that is known a prior to provide a poor fit to the data. The most common baseline model is the null (or independence) model, which specifies no relationships between the constructs composing the model. Several examples of indices of comparative fit are described as follows.

(a) NFI. Bentler and Bonett (1980) have suggested a Normed fit index (NFI), defined as $(X^2_{indep} - X^2_{model})/X^2_{indep}$. The NFI ranges from 0 to 1, with values exceeding 0.9 indicating a good fit. The NFI indicates the percentage improvement in fit over the baseline independence model. For example, an NFI of 0.9 means that the model is 90% better fitting than the null model. Although the NFI is widely used, it may underestimate the fit of the model in small samples.

(b) NNFI. The non-normed fit index (NNFI) adjusts the NFI for the number of degrees of freedom in the model. The NNFI reduces the problem of underestimating fit, but it may result in numbers outside of the 0 to 1 range. Higher values of the NNFI indicate a better fitting model, and it is common to apply the 0.90 rule as indicating a good fit to the data.

(c) IFI. Bollen's (1989) incremental fit index (IFI) is given by $(X^2_{indep} - X^2_{model})/(X^2_{indep} - df_{model})$. IFI values range between 0 and 1., with higher values indicating a better fit to the data.

(d) CFI. Bentler (1990) proposes a comparative fit index (CFI) based on the non-central X^2 distribution. The CFI also ranges between 0 and 1, with values exceeding 0.90 indicating a good fit to the data.

(e) RFI. Marsh and colleagues (1988) proposed a relative fit index (RFI), which ranges between 0 and 1, with values exceeding 0.90 indicating a good fit to the data.

(f) ECVI. Browne and Cudeck (1989) suggest the use of the expected cross-validation index (ECVI) by using a single sample. However, cross-validation requires two samples: a calibration sample and a validation sample. The procedure relies on fitting a model to the calibration sample, and then evaluating the discrepancy between the covariance matrix implied by the model to the covariance matrix of the validation sample. The ECVI estimates the expected discrepancy over all possible calibration samples. The ECVI has a lower bound of zero but no upper bound. Smaller values indicate better-fitting models.

(3) Parsimonious Fit. Parsimonious fit indices are concerned primarily with the cost-benefit trade-off of fit and degrees of freedom. Several of the indices can be calculated by adjusting other indices of fit for model complexity.

(a) PNFI. James and colleagues (1982) have proposed the parsimonious normed fit index (PNFI), which adjusts the NFI for model parsimony. The PNFI ranges from 0 to 1, with higher values indicating a more parsimonious fit. There is no standard for how high index should be to indicate parsimonious fit.

(b) PGFI. The parsimonious goodness-of-fit index (PGFI) adjusts the GFI for the degrees of freedom in the model. The PGFI ranges from 0 to 1, with higher values indicating a more parsimonious fit. There is no standard for how high an index should be

to indicate parsimonious fit. The PGFI of the three models of this study is 0.42, 0.38 and 0.42. The modified model (I) has the worst fit.

(c) AIC and CAIC. The Akaike Information Criterion (AIC) and Consistent Akaike Information Criterion (CAIC) (Akaike, 1987; Bozdogan, 1987) consider the fit of the model and the number of estimated parameters as the measures of parsimonious fit. Neither index is scaled to range between 0 and 1. Smaller values of the AIC and CAIC indicate a more parsimonious model, but there are no conventions or guidelines to indicate what "small" means. Interpretation of the AIC and CAIC is based on comparing competing models and choosing the model that shows the most parsimony.

5. Model modification. The goal of model respecification is to improve either the parsimony or the fit of the model (MacCallum, 1986). Thus, respecification typically consists of one of two forms of model modification: (1) delete nonsignificant paths from the model, or (2) add paths to the model based on the empirical data. According to Kelloway (1998), there are several approaches to solve the problem when the model does not fit the data. One solution to an ill-fitting model is to simply stop testing and declare the theory that guided model development to be wrong. Another solution to an ill-fitting model is to use the available information to try to generate a more appropriate model. This is the art of model modification- changing the original model to fit the data (Kelloway, 1998).

The principal danger in post hoc model modification is that this procedure is exploratory. Thus, model modifications need to have some semblance of theoretical consistency. For instance, if there are 20 studies suggesting that job satisfaction and job performance are unrelated, do not hypothesize a path between satisfaction and

performance just to make the model fit. Inspection of the LISREL-produced modification indices suggests several likely additional parameters such as the correlations between observed variables, i.e., modification indices greater than 5.0(Kelloway, 1998). Although the modification index suggests that a substantial improvement in fit could be obtained from making this modification, it may contain the dangers associated with post hoc model modifications (Kelloway, 1998).

CHAPTER 4

RESULTS

The survey data that was obtained in this study is reported in this chapter. A complete analysis and discussion of these results is presented in Chapter 5.

Survey Response Results

At the City of Denton, 1100 email addresses of the employees were used in order to invite them to fill out the on-line survey for this project in Spring 2001, 339 surveys were submitted, resulting in an initial response rate of 30.82%. Most of the responses were received within a two-week period. A follow-up email was considered necessary and extended the deadline for another two weeks. Following-up with the emailing list improved the response rate. Of the on-line surveys submitted, 168 were discarded because they were incomplete (up to 20% of the values were missing), leaving 171 usable surveys, a 15.55% final response rate. Responses were anonymously and automatically coded via Web server and converted to a Microsoft Excel 2000 file. Simple data screening (e.g., frequency distributions) was performed using SPSS version 9.0 for Windows. Although the overall response rate is low, this response rate does not appear to be unusual for on-line surveys.

Respondent Characteristics

In the on-line survey, 49% of the responses were from men, 48% were from women, and 3% were missing data. The survey was taken by an almost equal number of male and female participants. About 86.4% of the respondents were between the age of 25 and 55. There were few workers below 25 or over 55 years of age, less than 5.5%. The average age of the participants was 40.2. About 80.8% of the respondents have at least a

college degree. About half of the participants have a degree from a four-year college or graduate school, whereas 13% are high school graduates. These results indicate that the respondents in this study are well qualified to rate the on-line survey. The distribution of the respondents by gender, age, and education is shown in Tables 11 through 13.

Table 11

Distribution of Respondents by Gender

	Frequency	Percent
1. Female	166	49.1%
2. Male	163	47.9%
Valid data	330	97.1%
Missing data	10	2.9%
Total	339	100.0%

Table 12

Distribution of Respondents by Age

Age range	Frequency	Percent
15 and Under 25 years old	13	3.9%
25 and Under 35 years old	86	25.4%
35 and Under 45 years old	110	32.3%
45 and Under 55 years old	97	28.7%
55 and Under 65 years old	18	5.4%
Valid data	324	95.6%
Missing data	15	4.4%
Total	339	100.0%

Table 13

Distribution of Respondents by Education

	Frequency	Percent
1. High School	40	11.8%
2. Some college	80	23.6%
3. Two-year college	39	11.5%
4. Four-year college	92	27.1%
5. Graduate school	63	18.6%
Valid data	314	92.6%
Missing data	25	7.4%
Total	339	100.0%

About 15.6% of respondents have worked for COD over 2 and below 4 years, 14.4% over 10 years and below 15 years, and 14.1% over 6 years and below 10 years. The average tenure of the survey participants with the City is 8.4 years. The distribution of years range of respondents worked for the COD is shown in Table 14.

Table 14

Distribution of Years Range of Respondents Worked for the COD

Years Range	Frequency	Percent
Less than 1 year	41	12.3%
1 and Under 2 years	29	8.7%
2 and Under 4 years	52	15.6%
4 and Under 6 years	41	12.3%
6 and Under 10 years	47	14.1%
10 and Under 15 years	48	14.4%
15 and Under 20 years	44	13.2%
20 and More than 20 years	31	9.3%
Valid data	333	100.0%
Missing system	6	
Total	339	

About 23.7% of the respondents have been less than 1 year in their current job, 23.6% over 2 and below 4 years, 16.7% over 1 and below 2 years. In other words, about 64% of the respondents have been in their job no more than 4 years. On average, the participants held their current positions for about 4.4 years. The distribution of the years' range of the respondents having been their current job is shown is Table 15.

Table 15

Distribution of Years Range of Respondents Having Been Their Current Job

Years range	Frequency	Percent
Less than 1 years	80	23.7%
1 and Under 2 years	56	16.7%
2 and Under 4 years	79	23.6%
4 and Under 6 years	45	13.4%

6 and Under 10 years	29	8.7%
10 and Under 15 years	32	9.6%
15 and Under 20 years	13	3.9%
20 and More than 20 years	5	1.5%
Total	339	100.0%

About 24.3% of the respondents have over 10 and below 15 years of experience using IT, 22.6% over 15 and below 20 years of experience, and 15% over 6 and below 10 years of experience. In other words, about 61.9 of the respondents have at least 6 to 20 years of experience using IT. About 57% of the respondents have at least 10 years to over 20 years of experience using IT. The distribution of years of experience of the respondents using IT is shown in Table 16.

Table 16

Distribution of Years of Experience of Respondents Using IT

Years range	Frequency	Percent
Less than 1 years	5	1.5%
1 and Under 2 years	9	2.7%
2 and Under 4 years	29	8.6%
4 and Under 6 years	41	12.2%
6 and Under 10 years	51	15%
10 and Under 15 years	82	24.3%
15 and Under 20 years	76	22.6%
20 and More than 20 years	34	10.1%
Valid data	327	100%
Missing data	12	
Total	339	

The survey participants come from all 21 departments that are listed in the survey. Ten employees report they work for a department other than those listed. About 19.2% of the responses are from the department of public safety including police, fire, animal control, and code enforcement, 8.8% from the department of water, wastewater, and drainage, and 7.7% from the department of budget and fiscal operations including

accounting, warehouse, purchasing, tax and treasury. The highest of the responses have a large difference from the second and third highest. The department of public safety has the largest group in the 333 employees at COD, and it also was highly and strongly encouraged to participate the survey by the department's manager. The overall response rate is 30.7%. The distribution of the respondents by their working departments is shown in Table 17.

Table 17

Distribution of Respondents by Working Departments

Department	Frequency	Percent	N of employees	Participation rate
(1) Budget & Fiscal Operations	26	7.7%	45	57.8%
(2) Building, Planning, & Zoning	14	4.1%	26	53.8%
(3) Community Development	11	3.2%	14	78.6%
(4) Customer Service	10	2.9%	32	31.3%
(5) Engineering	15	4.4%	135	11.1%
(6) Electricity	22	6.5%	33	66.7%
(7) Facility Management	9	2.7%	11	81.8%
(8) General Govt.	7	2.1%	15	46.7%
(9) Human Resources	12	3.5%	15	80.0%
(10) Legal	8	2.4%	10	80.0%
(11) Library	21	6.2%	40	52.2%
(12) Motor Pool and Maintenance	2	.6%	16	12.5%
(13) Municipal Court	5	1.5%	15	33.3%
(14) Parks	21	6.2%	72	29.2%
(15) Public Safety	65	19.2%	333	19.5%
(16) Safety, Training, and Risk Management	1	.3%	8	12.5%
(17) Solid Waste, Landfill, & Recycling	8	2.4%	78	10.3%
(18) Technology Services	22	6.5%	28	78.6%
(19) Transportation	13	3.8%	33	39.4%
(20) Utilities Administration	7	2.1%	7	100.0%
(21) Water, Wastewater, & Drainage	30	8.8%	128	23.4%
(22) Others _____	10	2.9%	10	-
Total	339	100.0%	1104	30.7%

Regarding the software used by the respondents, about 92% used GroupWise, 83.8% used Microsoft Word, and 82% used Microsoft Excel. In other words, the software GroupWise, Word and Excel are the most popular software packages used at the City of

Denton. In contrast, about 36.9% of respondents asked for more training on Microsoft PowerPoint, 33.9% asked for more training on Microsoft Excel, and 23.6% asked for more training on Adobe Illustrator. The important thing is that 82% of respondents used Excel, but 33.9% of them also asked for more training on it. This may indicate a heavy usage of Excel at COD. The distribution of the respondents by software used and more training is shown in Table 18.

Table 18

Distribution of Respondents by Software Used and More Training

Software applications	Software used		More training	
	Frequency	Percent	Frequency	Percent
1. Adobe Illustrator	58	17.1%	80	23.6%
2. Aldus Page Maker	13	3.8%	51	15.0%
3. Amazon Billing	3	0.9%	28	8.3%
4. ArcExplorer (ESRI)	48	14.2%	75	22.1%
5. ArcInfo	20	5.9%	60	17.7%
6. Brio	38	11.2%	68	20.1%
7. C/S Fleet Maintenance System	5	1.5%	39	11.5%
8. CityWorks	9	2.7%	37	10.9%
9. Civicall	62	18.3%	59	17.4%
10. Class	13	3.8%	27	8.0%
11. Court Specialists Inc System	11	3.2%	29	8.6%
12. CRW Trak-it	25	7.4%	39	11.5%
13. Dynix Library System	24	7.1%	23	6.8%
14. Excel	278	82%	115	33.9%
15. Geographic Information System	37	10.9%	72	21.2%
16. Groupwise	312	92%	69	20.4%
17. Harris Billing System	45	13.3%	46	13.6%
18. ICS/VisionAir	14	4.1%	41	12.1%
19. JDEdwards Human Resources	40	11.8%	51	15.0%
20. LaserFiche	8	2.4%	35	10.3%
21. MetaCube Data Warehousing	0	0.0%	26	7.7%
22. Microsoft Project	36	10.6%	60	17.7%
23. Microsoft Publisher	96	28.3%	68	20.1%
24. Microsoft Request	22	6.5%	35	10.3%
25. Powerpoint	198	58.4%	125	36.9%
26. SpindleMedia	3	0.9%	23	6.8%
27. Tax Accounting System	4	1.2%	28	8.3%
28. Teleworks	6	1.8%	28	8.3%
29. Trashflow	6	1.8%	25	7.4%
30. Veritas Backup Express	2	0.6%	23	6.8%
31. Web Casting	1	0.3%	30	8.8%

32. Word	284	83.8%	69	20.4%
33. WordPerfect	76	22.4%	27	8.0%

About 38.6% of respondents had completed training on GroupWise, 24.8% on PowerPoint, and 25.1% on Windows 98. Although 24.8% of respondents had training on PowerPoint, 36.9% of respondents asked for more training on PowerPoint. It indicates the usage of PowerPoint is high at the City of Denton. The distribution of the respondents who completed all the software training is shown in Table 19.

Table 19

Distribution of Respondents Completed All the Software Training

	Frequency	Percent
1. A+ Certification	2	0.6%
2. A+ Complete	0	0.0%
3. Access - Part 1	75	22.1%
4. Access - Part 2	30	8.8%
5. Excel - Expert User	26	7.7%
6. Excel - Proficient User	79	23.3%
7. GroupWise	131	38.6%
8. PowerPoint	84	24.8%
9. PowerPoint 2000 Cheat Sheet	4	1.2%
10. PowerPoint 2000 Exam Prep	1	0.3%
11. TimeQuest	2	0.6%
12. How Computers Work	20	5.9%
13. Windows 98	85	25.1%
14. Windows 98 Upgrade Training	19	5.6%
15. Word - Expert User	26	7.7%
16. Word - Proficient User	82	24.2%

About 69.6% of the respondents worked for the COD over 40 and below 45 hours per week, 16.9% worked over 45 and below 55 hours, and 9.4% worked over 55. There were few who worked for COD below 40 hours, 4.2%. The distribution of the respondents working hours per week is shown in Table 20.

Table 20

Distribution of Hours Range of Respondents Working Hours Per Week

Hours Range	Frequency	Percent
Under 30 hours	10	3.0%
30 and Under 40 hours	4	1.2%
40 and Under 45 hours	236	69.6%
45 and Under 55 hours	57	16.9%
55 and More than 55	32	9.4%
Total	339	100.0%

About 66.8% of respondents used IT to perform the COD work over 20 and below 50 hours per week. There were few respondents used IT to perform the work over 50 hours, approximately 2%. It indicates that COD employees rely on IT to perform their work on certain levels. The distribution of hours range of respondents used IT to perform the COD work is shown in Table 21.

Table 21

Distribution of Hours Range of Respondents Used IT to Perform the COD Work

Hours range	Frequency	Percent
0 and Under 10 hours	60	17.8%
10 and Under 20 hours	46	13.6%
20 and Under 30 hours	74	21.9%
30 and Under 40 hours	88	26.0%
40 and Under 50 hours	64	18.9%
50 and More than 50 hours	7	2.1%
Total	339	100.0%

The survey respondents represent a broad range of job types as shown in Table 22. About 24.5% of the responses were from professionals, 21.8% from technical paraprofessionals, and 17.7% from mid-level managers. The three highest percentages of responses from these professionals indicate that they are the predominant IT users at the COD location. About 54% of the respondents hold a position of operational nature (i.e.,

field service, office and clerical, technical and supervisory) whereas the remaining participants hold a managerial or professional position. The distribution of respondents by job types is shown in Table 22.

Table 22

Distribution of Respondents by Job Type

	Frequency	Percent
1. Field Service	12	3.5%
2. Mid-level managers	60	17.7%
3. Office/Clerical	58	17.1%
4. Professionals	83	24.5%
5. Supervisors	23	6.8%
6. Technical paraprofessionals	74	21.8%
7. Others	29	8.6%
Total	339	100.0%

Demographic analysis from 171 usable surveys is also shown in Table 46 through Table 57 in Appendix C. The distributed percent is a little different from the demographic analysis of the 339 surveys. The comparison between the two demographic analyses may merit consideration for future studies of the City of Denton.

IS-SERVQUAL Ratings

Responses from the COD employees to the IS-SERVQUAL survey instrument show that the COD employees believe that they get along well with members of the Technology Service Department's (TSD) staff. They also believe that the TSD staff keeps them informed in advance of scheduled system downtime, and the members of the TSD staff are courteous. The COD's employees slightly believe that the TSD staff ensures that users are properly trained on new systems. They also slightly believe that the members of the TSD staff seek input from users before making changes to existing systems.

Moreover, they also slightly believe that the TSD staff provides adequate training support for their needs.

Since SERVQUAL scores are often reported according to the dimension they represent, the IS-SERVQUAL scores are shown by dimension in the right column of Table 23. These dimensions correspond to reliability, competence, responsiveness, timeliness, communications, training, empathy, attitude/commitment to user involvement, relationships, and access. The item numbers correspond to the items that compose each of these respective dimensions, according to Van Dyke, Kappelman, and Prybutok (1997). The number of valid responses as well as the mean and standard deviation are shown for each dimension. The dimensions rated higher in expectation are relationships, access, and competence, with a mean of 5.12, 5.00, and 4.84. The dimensions rated lower in expectation are training, user involvement, and timeliness with a mean of 4.06, 4.12 and 4.35. The descriptive statistics of IS-SEVQUAL are shown in Table 23.

Table 23

Descriptive Statistics of IS-SERVQUAL

	Question	N	Mean	Std	Dimension	Average
SERVQ1	The TSD staff does what it promises to do.	260	4.36	1.52	Reliability	4.41
SERVQ2	The TSD staff is reliable.	264	4.53	1.52		
SERVQ3	The TSD staff performs services right the first time.	260	4.11	1.59		
SERVQ4	The TSD staff is dependable.	264	4.50	1.56		
SERVQ5	**Reliability** means the extent to which the TSD staff performs promised service dependably. Please rate the overall reliability of the TSD staff.	261	4.54	1.46		
SERVQ6	The members of the TSD staff have the technical skills needed to do their jobs well.	244	4.92	1.43	Competence	4.84(3)
SERVQ7	The members of the TSD staff are appropriately qualified for their jobs.	236	4.92	1.37		
SERVQ8	The TSD staff has the expertise required to create or evaluate for purchase the information technologies needed by the City.	228	4.84	1.49		
SERVQ9	The TSD staff has the expertise required to maintain the computer-based information systems needed by the City.	237	4.74	1.48		

SERVQ10	The members of the TSD staff have an amount of experience appropriate for their positions.	208	4.75	1.43		
SERVQ11	**Competence** means the technical skills and expertise of the TSD staff. Please rate the overall competence of the TSD staff.	253	4.84	1.48		
SERVQ12	When I have a problem, the TSD staff does its best to respond as soon as possible.	261	4.83	1.68	Responsiveness	4.74
SERVQ13	The people on the TSD staff return my calls promptly.	258	4.71	1.60		
SERVQ14	Members of the TSD staff respond quickly to e-mails requesting information or assistance.	228	4.70	1.59		
SERVQ15	Members of the TSD staff are always willing to help.	259	5.03	1.58		
SERVQ16	The TSD department responds quickly to my requests for help with software applications.	237	4.48	1.61		
SERVQ17	**Responsiveness** means the willingness and speed with which the TSD staff makes an initial response to inquires from users. Please rate the overall responsiveness of the TSD staff.	257	4.71	1.55		
SERVQ18	When problems occur, the TSD staff solves them in a timely manner.	263	4.46	1.58	Timeliness	4.35(-3)
SERVQ19	The TSD staff finishes projects on time.	224	4.20	1.57		
SERVQ20	The members of the TSD staff meet their deadlines during system development and implementation.	199	4.23	1.61		
SERVQ21	Change requests are completed in a timely manner.	205	4.43	1.48		
SERVQ22	**Timeliness** means the elapsed time between a user's request and the design, development and implementation of new applications or change requests by the TSD staff. Please rate the timeliness of the TSD staff.	227	4.42	1.52		
SERVQ23	The members of the TSD staff are able to explain new systems/software in a manner that I can understand.	233	4.58	1.63	Communications	4.81
SERVQ24	The TSD staff keeps me informed in advance of scheduled system downtime.	262	5.32 (2)	1.46		
SERVQ25	The TSD staff keeps me informed of the status of ongoing projects that will affect my job.	237	4.67	1.63		
SERVQ26	It is easy for me to communicate with the TSD department.	259	4.75	1.59		
SERVQ27	The TSD staff demonstrates good interpersonal communication skills in their interactions with other people.	258	4.86	1.64		
SERVQ28	**Communications** means the exchange of pertinent information between the TSD staff and the users. Please rate the overall communication ability of the TSD staff.	261	4.68	1.55		
SERVQ29	The TSD staff ensures that users are properly trained on new systems.	236	3.77(-1)	1.58	Training	4.06(-1)
SERVQ30	The TSD staff provides adequate training support for my needs.	239	3.93(-3)	1.60		
SERVQ31	The training provided by the TSD staff is helpful.	226	4.44	1.51		
SERVQ32	The TSD staff understands that a new project is not over until the user training is complete.	200	4.14	1.68		
SERVQ33	**Training** means the amount of instruction and support for learning that is afforded to the user to increase the user's proficiency in utilizing Information Technologies. Please rate the training provided by the TSD staff.	219	4.04	1.64		
SERVQ34	The TSD staff understands the specific needs of the users.	225	4.13	1.60	Empathy	4.45
SERVQ35	My IT-related problems are important to the TSD staff.	231	4.46	1.59		

SERVQ36	The members of the TSD staff understand my frustrations with COD ITs.	222	4.41	1.60		
SERVQ37	The members of the TSD staff have my best interest at heart.	234	4.47	1.66		
SERVQ38	The members of the TSD staff show a sincere interest in helping me with my problems.	242	4.70	1.61		
SERVQ39	**Empathy** means the ability of the TSD staff to understand the specific needs of the user. Please rate the overall empathy of the TSD staff.	236	4.55	1.58		
SERVQ40	People on the TSD staff are open to suggestions from users regarding how Information Technology systems can be improved.	196	4.32	1.64	Attitude	4.12(-2)
SERVQ41	The members of the TSD staff are committed to user involvement in the design, development or alteration of COD ITs.	193	4.19	1.69		
SERVQ42	The members of the TSD staff seek input from users before making changes to existing systems.	203	3.80(-2)	1.74		
SERVQ43	The TSD staff considers users to be part of the development team.	200	3.98	1.70		
SERVQ44	**Attitude/Commitment** to user involvement means the commitment of the TSD staff to support user involvement and participation in the design, development, or alteration of computer-based information systems. Please rate the Attitude/Commitment to user involvement of the TSD staff.	215	4.31	1.60		
SERVQ45	The members of the TSD staff have a good working relationship with people in other departments.	225	4.66	1.61	Relationships	5.12 (1)
SERVQ46	I have a good working relationship with the members of the TSD staff.	244	5.13	1.54		
SERVQ47	The members of the TSD staff are courteous.	252	5.27(3)	1.42		
SERVQ48	I get along well with members of the TSD staff.	244	5.35 (1)	1.37		
SERVQ49	**Relationships** mean the manner and methods of interaction, conduct, and personal association between users and the TSD staff. Please rate the relationships between you and the TSD staff.	242	5.19	1.39		
SERVQ50	The COD's computer/network is available when I need to use it.	261	4.91	1.51	Access	5.00(2)
SERVQ51	I can gain access to COD system resources when needed for work.	259	4.89	1.46		
SERVQ52	COD Help Desk and system support have operating hours convenient to the users.	248	5.03	1.49		
SERVQ53	The software that I need to do my job is available during working hours.	261	5.26	1.37		
SERVQ54	**Access** means the availability or ease with which the appropriate hardware, software, and people can be utilized to support the performance of your work. Please rate the access provided by the TSD staff.	254	4.90	1.43		

IS-SUCCESS Rating

The IS-SUCCESS scores are reported according to the dimension they represent and are shown by dimension in the right column of Table 24. These dimensions correspond to IT quality, data and information quality, use, user satisfaction, individual

impact, and organizational impact. The item numbers correspond to the items that compose each of these respective dimensions. The number of valid responses as well as the mean and standard deviation are shown for each dimension. The dimensions rated higher in expectation are organizational impact and individual impact with a mean of 5.03 and 4.88. The dimensions rated lower in expectation are user satisfaction, and data and information quality with a mean of 4.70 and 4.77. Note that the dimension of Use is the ordinal (i.e., not scale) measurement so it is not compared with other dimensions of the IS-SUCCESS. The descriptive statistics of IS-SUCCESS are shown in Table 24.

Table 24

Descriptive Statistics of IS-SUCCESS

	Question	N	Mean	Std	Domain	Average
	Regarding IT you use as a COD employee, please rate the following (1-6):					
SUCCES1	reliability	258	4.59(-1)	1.49	IT Quality	4.85
SUCCES2	ease of use	258	4.90(3)	1.31		
SUCCES3	accessibility	259	4.82	1.43		
SUCCES4	usefulness	259	5.14(1)	1.38		
SUCCES5	flexibility	255	4.75	1.46		
SUCCES6	Please rate the OVERALL quality of IT in the COD.	260	4.89	1.38		
	Regarding the data and information provided by the COD's IT, please rate the following (7-13)					
SUCCES7	content	236	4.84	1.28	Data & Info Quality	4.77(-2)
SUCCES8	availability	240	4.78	1.38		
SUCCES9	accuracy	233	4.89	1.32		
SUCCES10	timeliness	238	4.63(-2)	1.36		
SUCCES11	conciseness	234	4.76	1.33		
SUCCES12	convenience	237	4.72	1.43		
SUCCES13	Please rate the overall quality of data and information provided by the COD's IT.	239	4.79	1.31		
SUCCES14	Overall, I am satisfied with the COD's IT.	257	4.70(-3)	1.52	User satisfaction	4.70(-1)
SUCCES15	Overall, there has been a positive impact as to how much my performance was improved by the aid of COD's IT.	249	4.88	1.51	Individual impact	4.88(2)
SUCCES16	Overall, there has been a positive impact as to how much the COD's performance was improved by the aid of IT.	238	5.03(2)	1.48	Organizational impact	5.03(1)
DEMO2_US	Use software application and would like to have more training.	336	10.14	7.36	Use	9.52
DEMO5_US	How many hours per week do you use IT to perform your COD work?	330	25.11	14.91		
DEMO8_US	How many years of experience do you have using IT?	327	10.92	6.30		

ITG Rating

In the survey, measuring controlling objectives for information and related technology, the COD employees strongly agree that management in the COD is concerned with the impact on society from the products, service, or operations. They also strongly agree that the COD's IT plan was developed taking into account the considerations of IT market and assessment of current COD systems in terms of IT resources such as people, applications, technology, facilities, and data. The COD employees slightly agreed that IT standards and guidelines are established and translated into practical and usable rules for employees. They also slightly agreed that the COD establishes and communicates IT policies and procedures to all employees. Moreover, they also did not perceive that the COD has a well-defined plan for IT. Note that the ITG instrument only corresponds to one dimension and the average is 4.55. The descriptive statistics of ITG are shown in Table 25.

Table 25

Descriptive Statistics of ITG

	Question	N	Mean	Std
ITG17	The COD has a well defined plan for IT.	184	4.37(-3)	1.66
	The COD's IT plan was developed taking the following into consideration (18-21):			
ITG18	organization's strategies and plans.	172	4.58	1.51
ITG19	IT support for the COD goals and objectives.	177	4.67	1.51
ITG20	IT market.	168	4.70(2)	1.43
ITG21	assessment of current COD systems in terms of IT resources (people, applications, technology, facilities, and data).	183	4.70(3)	1.49
ITG22	The COD uses a predefined set of standards and guidelines to evaluate all requests for IT purchases and modifications.	159	4.60	1.53
ITG23	IT investments and operating budgets are established and approved with consideration of alignment with the COD's strategies and plans.	165	4.57	1.49
ITG24	The COD establishes and communicates IT policies and procedures to all employees.	219	4.31(-2)	1.62
ITG25	The COD establishes and maintains IT standards and guidelines that take organizational goals and objectives into consideration.	183	4.50	1.51
ITG26	In the COD, IT standards and guidelines are established and translated into practical and usable rules for employees.	208	4.31(-1)	1.51

ITG27	Management in the COD is not concerned with the impact on society of our products, services, or operations.	203	4.71(1)	1.77

IS-ALIGN Rating

From the survey of the organization-IS alignment for IT use, the three strongest agreements of the employees are that the COD uses IT to support (1) organizational and employee learning, (2) to communicate values and expectations, and (3) to increase customer/citizen satisfaction. The COD's employees slightly agree that the COD uses IT to make regular comparisons of its performance to similar world-class organizations to support its overall performance, evaluation, and improvement efforts. They also slightly agree that the COD uses IT for performance review and feedback for improvement and innovation opportunities, and to identify customer/citizen groups and market segments. Note that the IS-ALIGN instrument only corresponds to one dimension and the average is 4.86. The descriptive statistics of IS-ALIGN are shown in Table 26.

Table 26

Descriptive Statistics of IS-ALIGN

	Question	N	Mean	Std.
	The City of Denton uses IT...			
ALIGN1	to achieve high quality performance that applies consistently throughout all facets of the organization.	224	5.22(2)	1.40
ALIGN2	to communicate values and expectations.	229	4.98	1.47
ALIGN3	to set goals and objectives.	223	4.85	1.44
ALIGN4	to set plans and strategies to achieve goals and objectives.	218	4.89	1.44
ALIGN5	to reinforce an environment for empowerment and innovation.	226	4.92	1.55
ALIGN6	to support organizational and employee learning.	237	5.23(1)	1.50
ALIGN7	to evaluate performance and capabilities of all functions of the organization.	219	4.72	1.54
ALIGN8	for performance review and feedback for improvement and innovation opportunities.	224	4.68(-2)	1.50
ALIGN9	to support and strengthen relationships with key segments of the community (such as education, community service organizations, religious organizations, or professional associations).	216	4.73	1.54
ALIGN10	to increase customer/citizen satisfaction.	224	5.10(3)	1.46
ALIGN11	to define human resources requirements.	210	4.84	1.47
ALIGN12	to enhance supplier/partner relationships.	188	4.82	1.44
ALIGN13	to allocate resources to ensure accomplishment of overall action plans.	198	4.85	1.47

ALIGN14	to determine current product/service requirement and expectation of its customers and citizens.	193	4.83	1.43
ALIGN15	to identify customer/citizen groups and market segments.	182	4.71(-3)	1.44
ALIGN16	to make necessary improvements to its processes.	205	4.87	1.47
ALIGN17	to make regular comparisons of its performance to similar world-class organizations to support its overall performance, evaluation, and improvement efforts.	191	4.62(-1)	1.50
ALIGN18	to gather internal performance data and information to help support overall plans, strategies, goals, and objectives.	207	4.79	1.50
ALIGN19	to gather external performance data and information to help support overall plans, strategies, goals, and objectives.	195	4.73	1.42
ALIGN20	to promote cooperation, individual initiatives, innovation, and flexibility.	212	4.84	1.56

EGOV Rating

In the survey, e-government readiness, the COD's employees most strongly agree that the Internet is an integral part of the COD business plans. They also strongly agree that the COD has clearly stated objectives of using the Internet and has a centralized function that oversees the development of all Internet applications. They slightly agree that all COD's Internet applications can share data with COD non-Internet applications. They also slightly agree that all COD's Internet applications share standardized data, and all of the COD's Internet applications can share data with other COD Internet applications.

The dimensions of EGOV correspond to planning, applications, and data. The item numbers correspond to the items that compose each of these respective dimensions, according to Koh and Balthazard (1997). The dimension rated highest in agreement is planning, with a mean of 4.77. The dimension rated lowest in agreement is data, with a mean of 4.17. The survey suggests that while the City is well aware of the strategic importance of e-government and regards e-government initiatives as an integral part of its overall business plan, it does not have the necessary data infrastructure that allows the

seamless flow of data from one function to another. The descriptive statistics of EGOV are shown in Table 27.

Table 27

Descriptive Statistics for the E-government Readiness

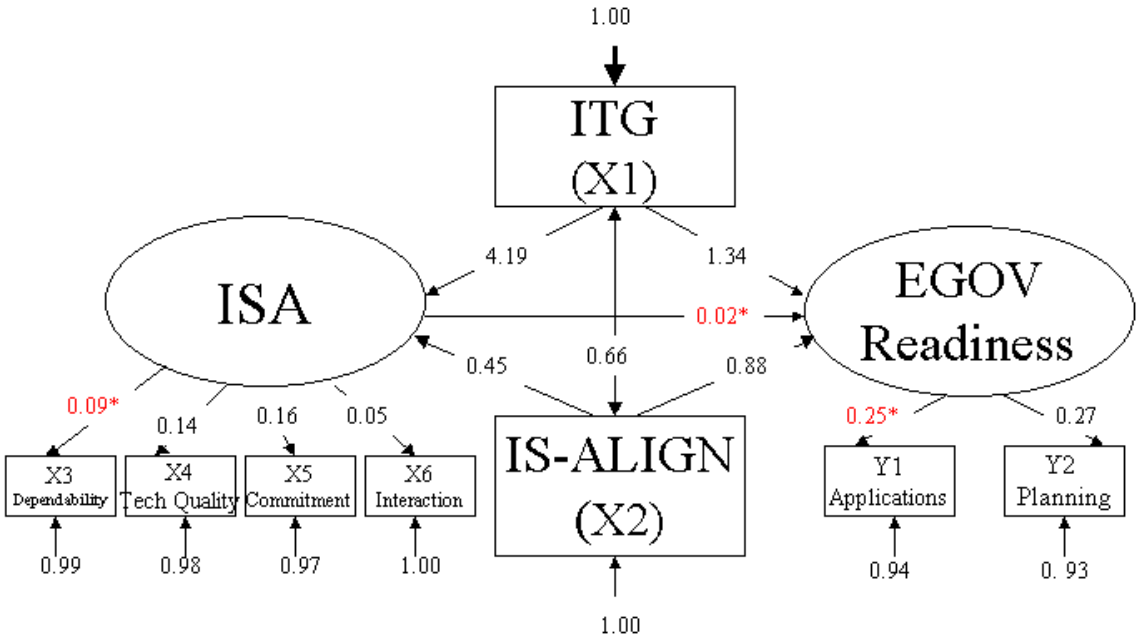
	Question	N	Mean	Std	Dimension	Average
EGOV39	The COD has strategic plans that govern all Internet activities.	192	4.43	1.58	Planning	4.77
EGOV40	The COD has clearly stated objectives of using the Internet.	228	4.71(2)	1.72		
EGOV41	The Internet is an integral part of the COD business plans.	215	5.38(1)	1.38		
EGOV42	The COD's Internet strategies are deliberately aligned with its strategic plans.	166	4.55	1.34		
EGOV43	The COD carefully coordinates development of all Internet applications.	183	4.48	1.48	Applications	4.53
EGOV44	The COD pays close attention to ensuring compatibility among Internet applications.	190	4.49	1.55		
EGOV45	The COD has a centralized function that oversees the development of all Internet applications.	180	4.65(3)	1.54		
EGOV46	The COD's Internet applications are designed and developed to work with legacy systems.	132	4.48	1.38		
EGOV47	All of the COD's Internet applications can share data with other COD Internet applications.	144	4.29(-3)	1.63	Data	4.17
EGOV48	All COD's Internet applications can share data with COD non-Internet applications.	144	4.04(-1)	1.64		
EGOV49	All COD's Internet applications share standardized data.	145	4.19(-2)	1.58		

Theoretical Model of E-government Readiness

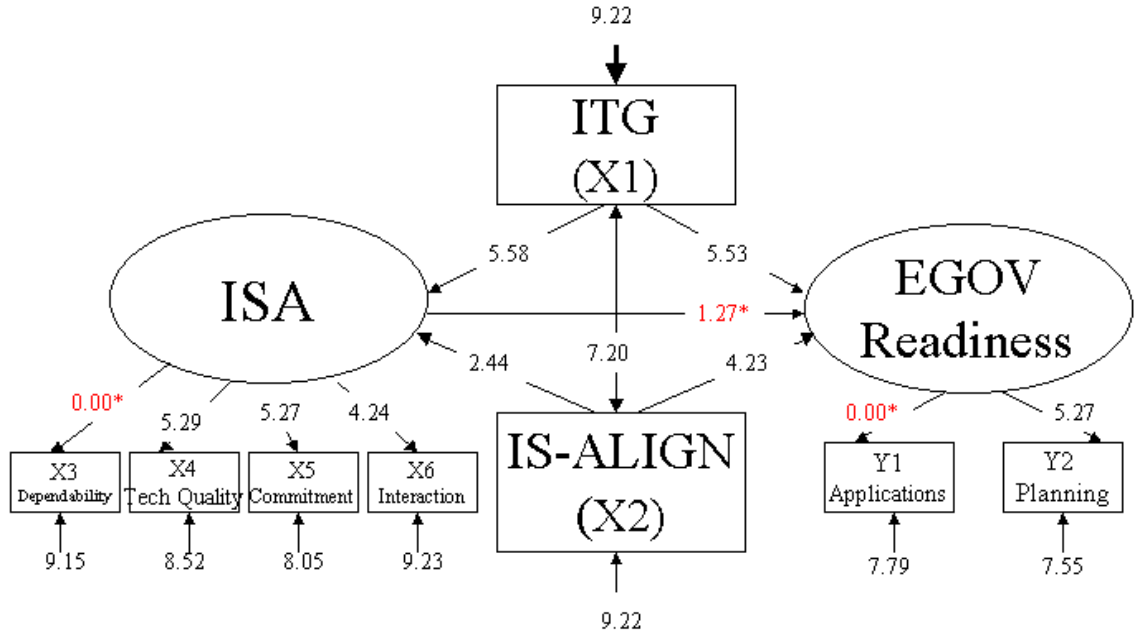
Using the data collected from the COD survey, the research model linking four instruments was tested: ISA, ITG, IS-ALIGN, and EGOV. Figure 17 shows a research model with the indicators to be tested. In this model, the ISA construct consists of four indicators, which are dependability, technical quality, commitment and interaction. The construct of EGOV consists of two indicators, which are applications and planning. Note that ITG and IS-ALIGN are assumed as a construct in the theoretical model, but they only contain a single indicator that is defined as an observed variable when operating the LISREL program. To sum up, the SEM of this study consists of two latent constructs

(ISA and EGOV) with eight indicators: ITG, IS-ALIGN, dependability, technical quality, commitment, interaction, applications, and planning.

Analysis of the theoretical model results in X^2=38.61, df=16, and p-value =0.00124, which indicates that the data does not fit the model well. The adjusted goodness-of-fit index (AGFI) value is 0.88 is also nonqualified to the recommended value of 0.9. The root mean square error of approximation (RMSEA) value of 0.09 is under the limit of 0.10 and implies a modest model fit. Overall, the fit indices indicate that the theoretical model does not reproduce the covariance matrix well. Moreover, the path coefficients are examined to determine whether they imply significant relationships between the corresponding constructs. In the theoretical model, most of the coefficients are positive and significant at 5% level, except coefficients between EGOV and ISA (t=1.27), EGOV and Applications (t=0.00), and ISA and Dependability (t=0.00). All these criteria are displayed in the theoretical model. The following two sections will introduce the two modified models (I) and (II), which both consist of good fit indices.



The path numbers are standardized solution (i.e., standardized coefficients ?).

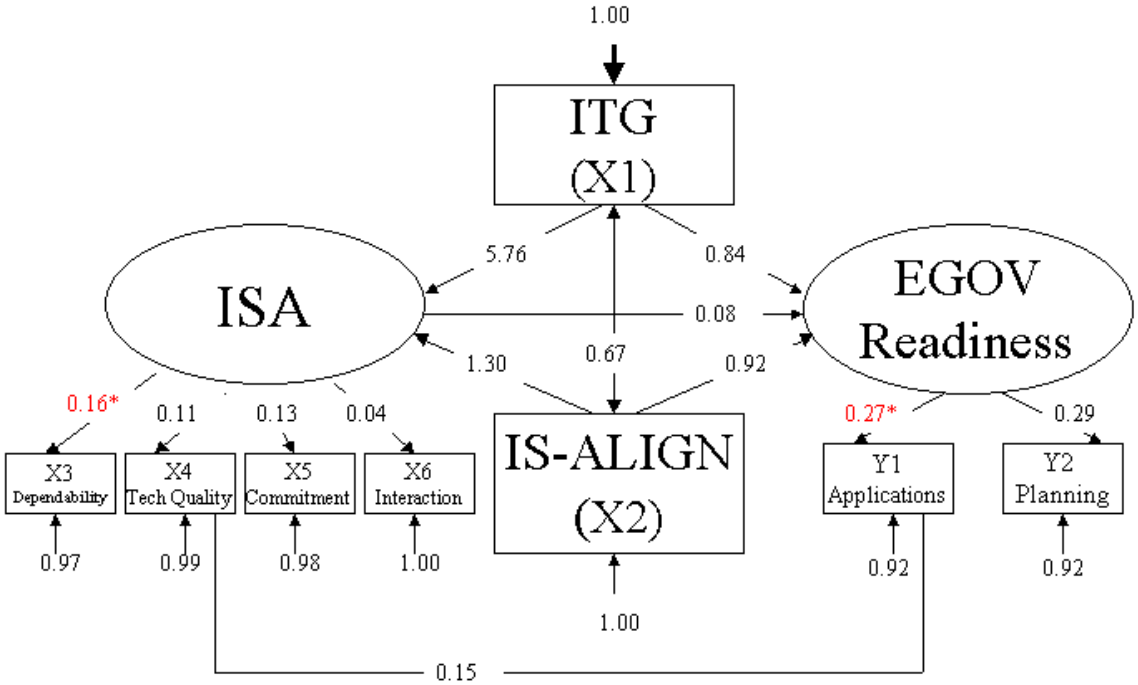


The path numbers are t-values.

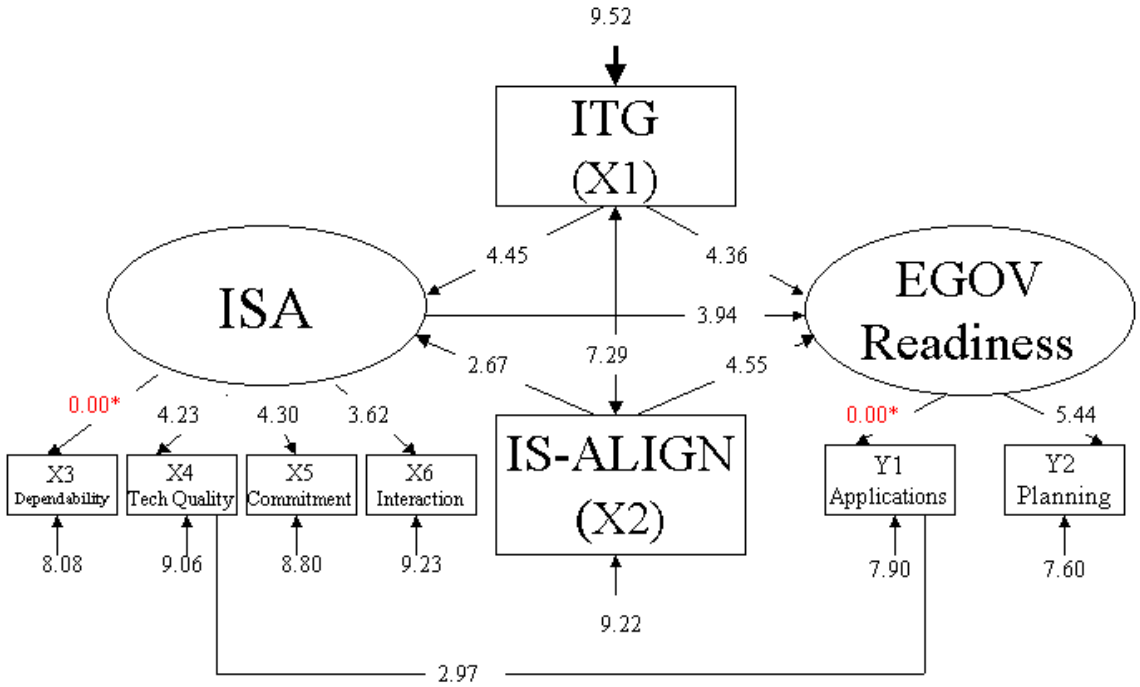
Figure 17. Theoretical model of e-government readiness (X^2=38.61, df=16, p-value=0.00124, RMSEA=0.091. Note that * indicates the path is non-significant.)

Modified Model (I) of E-government Readiness

The modified model (I) of e-government readiness represents a better model fit than the theoretical model; thus, the modified model (I) is proposed as a viable alternative based on the results of this study (see Figure 18 below). Analysis of the modified model (I) results in X^2=12.77, df=14, and p-value=0.54 and indicates that the data fit the model. Other indicators also confirm a good fit. The goodness-of-fit index (GFI) of 0.98 indicates that the model fits well because a GFI of 1.0 indicates a perfect fit. The root mean square error of approximation (RMSEA) value of 0.00 is under the limit of 0.10 and implies a good model fit. The adjusted goodness-of-fit index (AGFI) value of 0.95 is above the minimum recommended value of 0.9. Overall, the fit indices indicate that the first model of the e-government readiness reproduces the covariance matrix well. Other indications that the model fits the data well are that all standardized residuals are less than 2.0, except one (5.76). Moreover, the path coefficients are examined to determine whether they imply significant relationships between the corresponding constructs. In the modified model (I), most of the coefficients are positive and significant at the 5% level, except coefficients between EGOV and Applications (t=0.00), and ISA and Dependability (t=0.00). All these criteria are displayed in the modified model (I). A good fit of the modified model (I) of e-government Readiness is shown in Figure 18.



The path numbers are standardized solution (i.e., standardized coefficients ?).

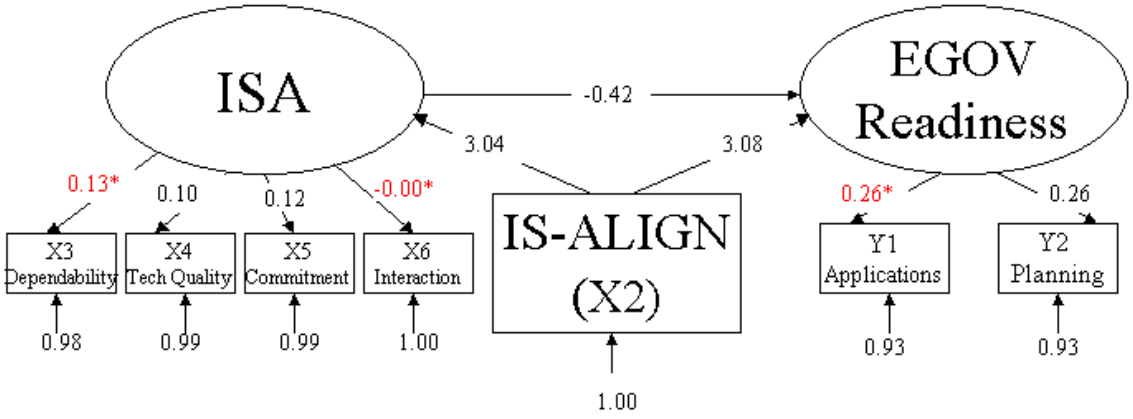


The path numbers are t-values.

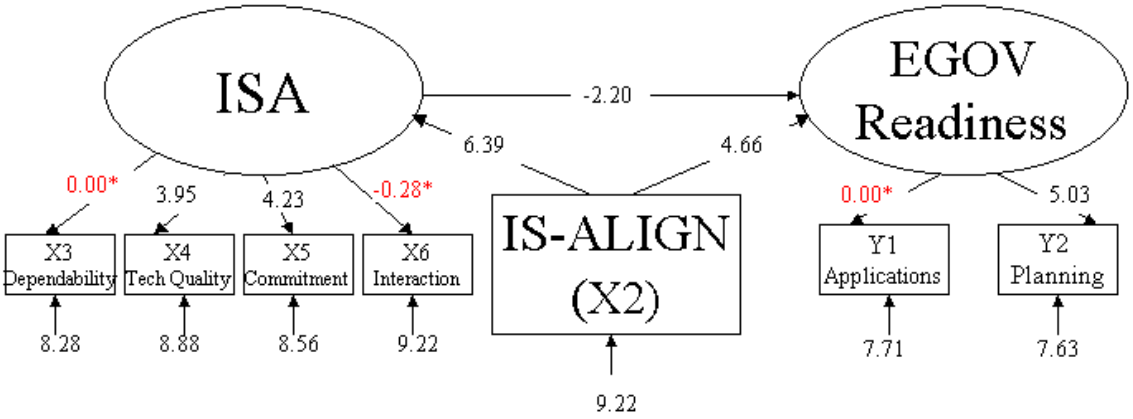
Figure 18. Modified model (I) of e-government readiness (X^2=12.77, df=14, p-value=0.54442, RMSEA=0.000. Note that * indicates the path is non-significant.)

Modified Model (II) of E-government Readiness

The modified model (II) of e-government readiness represents a better model fit than the theoretical model; thus, the modified model (II) is proposed as a viable alternative based on the results of this study (see Figure 19). Analysis of the modified model (II) results in X^2=12.67, df=12, and p-value=0.39 and indicates that the data fit the model. Other indicators also confirm a good fit. The goodness-of-fit index (GFI) of 0.98 indicates that the model fits well because a GFI of 1.0 indicates a perfect fit. The root mean square error of approximation (RMSEA) value of 0.02 is under the limit of 0.10 and implies a good model fit. The adjusted goodness-of-fit index (AGFI) value is 0.95, above the recommended value of 0.9. Overall, the fit indices indicate that the modified model (II) also reproduces the covariance matrix well. Moreover, the path coefficients are examined to determine whether they imply significant relationships between the corresponding constructs. In the modified model (II), most of the coefficients are positive and significant at the 5% level, except coefficients between EGOV and Applications (t=0.00), ISA and Dependability (t=0.00), and ISA and Interaction (t=-0.28). All these criteria indicate the modified model (II) is a good fit. Note that ISA impacts EOGV directly, but negatively, in the model. This feature is different from other models. The modified model (II) of e-government readiness is shown in Figure 19.



The path numbers are standardized solution (i.e., standardized coefficients ?).



The path numbers are t-values.

Figure 19. Modified model (II) of e-government readiness (X^2=12.67, df=12, p-value=0.39322, RMSEA=0.018. Note that * indicates the path is non-significant)

CHAPTER 5

DATA ANALYSIS

Introduction

The objective of the study is to develop and test an empirical model. The LISREL methodology involves a number of steps (Tague-Sutcliffe, Vaughan, & Sylvain, 1996): (1) identifying variables to be used, (2) collecting data on these variables, (3) developing the model, (4) testing the model against the data, and (5) revising the model if necessary and retesting it. Variables identified in the study will be discussed in detail later in the section of exploratory factor analysis (EFA) by performing factor analysis, multicollinearity, reliability and validity, and testing the partial models. Developing, testing, and revising the model will be discussed in detail later in the section of the confirmatory factor analysis (CFA).

Exploratory Factor Analysis (EFA)

Dimensions of the E-government Readiness Model

In order to determine the dimensional structures from different instruments, a factor analysis was performed using SPSS version 9.0 for Windows. The extraction method of Principal Axis Factoring was performed using the rotation method of Varimax with Kaiser Normalization. The loading rule was, choose a loading number greater than 0.5 on one factor, and less than 0.5 on all others (Hair, Anderson, Tathan, & Black, 1995). First, the factor analysis extracted 4 factors with Eigenvalues greater than 1 on the ISA instrument (including IS-SERVQUAL and IS-SUCCESS). After the varimax rotation was performed, the items pertaining to reliability, competence, responsiveness, and timeliness tended to load onto the same dimension, Dependability. The items

pertaining to access, system quality, information quality and user satisfaction tended to load onto the same dimension, Technical quality. The items pertaining to communications, training, empathy and attitude tended to load onto the same dimension, Commitment. The items pertaining to communications and relationships tended to load onto the same dimension, Interaction. The ISA instrument measures the constructs known as the Comprehensive IS Assessment and Contingency Theory invented by Myers, Kappelman, and Prybutok (1997). However, that theory is only partially confirmed via the factor analysis for the ISA instrument. A summary of the factor analysis for ISA is shown in Table 28 and 29.

Table 28

Initial Factor Analysis for ISA

	Factor						
	1	2	3	4	5	6	7
Reliability (IS-SEVQUAL)							
SERVQ1	**.728**	.319	.368	.129	.217	6.400E-02	.132
SERVQ2	**.796**	.362	.288	.176	.143	6.806E-02	6.853E-02
SERVQ3	**.711**	.359	.307	9.371E-02	.230	5.798E-03	.108
SERVQ4	**.733**	.324	.350	.201	.246	8.434E-02	7.478E-02
SERVQ5	**.736**	.376	.258	.208	.231	4.895E-02	.122
Competence (IS-SEVQUAL)							
SERVQ6	**.533**	.273	.272	.234	**.601**	-7.159E-02	8.068E-02
SERVQ7	**.588**	.225	.335	.223	**.580**	-5.636E-03	2.870E-03
SERVQ8	.451	.471	.405	.221	.452	6.370E-02	8.707E-03
SERVQ9	.487	.388	.399	.267	.488	6.852E-02	-5.388E-02
SERVQ10	**.540**	.350	.373	.299	**.500**	1.021E-03	4.177E-02
SERVQ11	**.529**	.348	.362	.245	**.553**	3.256E-02	-2.262E-02
Responsiveness (IS-SEVQUAL)							
SERVQ12	**.724**	.216	.278	.425	9.811E-02	-3.379E-02	-.185
SERVQ13	**.718**	.266	.229	.401	-5.093E-03	-.143	-.224
SERVQ14	**.722**	.317	.280	.366	2.425E-02	-9.570E-02	-.129
SERVQ15	**.614**	.296	.211	**.616**	.107	7.801E-03	-.156
SERVQ16	**.665**	.479	.317	.302	7.295E-02	4.538E-02	-1.044E-02
SERVQ17	**.722**	.350	.296	.383	9.460E-02	-2.085E-02	-4.898E-02
Timeliness (IS-SEVQUAL)							
SERVQ18	**.735**	.349	.291	.266	.157	1.695E-02	7.054E-02
SERVQ19	**.716**	.389	.377	.202	.127	2.989E-02	6.819E-02
SERVQ20	**.700**	.408	.337	.179	.147	2.855E-02	4.314E-02

SERVQ21	**.663**	.402	.353	.299	.125	2.716E-02	2.791E-02
SERVQ22	**.689**	.436	.293	.303	.146	-3.661E-02	8.179E-02
Communications (IS-SEVQUAL)							
SERVQ23	.469	**.601**	.220	.336	4.263E-02	-1.244E-02	2.096E-02
SERVQ24	.474	.147	.399	.317	.161	-.115	.135
SERVQ25	.430	.472	.263	.252	-7.942E-02	-7.091E-02	.206
SERVQ26	**.501**	.478	.328	.463	1.431E-03	-9.173E-02	-7.513E-02
SERVQ27	.406	.364	.275	**.620**	.103	.123	9.361E-02
SERVQ28	**.500**	**.527**	.324	.404	.155	.111	9.432E-02
Training (IS-SEVQUAL)							
SERVQ29	.387	**.727**	.323	7.433E-02	.124	3.030E-02	4.801E-02
SERVQ30	.343	**.766**	.356	.137	.169	4.772E-02	-7.665E-02
SERVQ31	.361	**.629**	.355	.235	.267	.187	-6.169E-02
SERVQ32	.368	**.719**	.392	.209	.141	.109	-1.338E-02
SERVQ33	.334	**.750**	.389	.163	.139	5.612E-02	-2.823E-02
SERVQ34	.325	**.750**	.381	.175	.128	5.377E-02	6.333E-02
Empathy (IS-SEVQUAL)							
SERVQ35	.341	**.568**	.321	.410	8.682E-02	-.134	-5.790E-02
SERVQ36	.153	**.584**	.401	.432	9.520E-02	-.188	-.112
SERVQ37	.351	**.590**	.361	.448	.110	-1.647E-02	7.916E-02
SERVQ38	.342	**.617**	.335	.451	.180	-4.340E-02	3.712E-02
SERVQ39	.345	**.684**	.317	.359	.114	-5.983E-02	8.135E-02
Attitude (IS-SEVQUAL)							
SERVQ40	.293	**.699**	.339	.354	.132	-.110	-1.866E-03
SERVQ41	.294	**.760**	.299	.280	9.638E-02	-2.810E-02	.111
SERVQ42	.307	**.761**	.351	.202	6.334E-02	-5.016E-02	-6.842E-03
SERVQ43	.333	**.753**	.318	.203	.127	-5.131E-02	5.399E-02
SERVQ44	.299	**.688**	.317	.344	.197	-1.715E-02	.101
Relationships (IS-SEVQUAL)							
SERVQ45	.402	**.545**	.261	**.554**	.144	.197	2.280E-02
SERVQ46	.239	.398	.362	**.693**	.174	.114	6.279E-03
SERVQ47	.385	.310	.184	**.757**	6.591E-02	-5.468E-02	-4.269E-02
SERVQ48	.349	.308	.210	**.755**	.165	-6.156E-02	-4.948E-03
SERVQ49	.327	.331	.315	**.727**	.129	3.238E-02	6.173E-02
Access (IS-SEVQUAL)							
SERVQ50	.260	.315	**.627**	.305	.189	-.364	-7.835E-02
SERVQ51	.263	.323	**.569**	.329	.182	-.408	-2.919E-02
SERVQ52	.476	.291	.450	.228	.149	-.218	-6.053E-02
SERVQ53	.194	.130	.434	.460	.236	-5.798E-02	-.254
SERVQ54	.334	.374	.487	.332	.317	-.129	.102
System quality (IS-SUCCESS)							
SUCCES1	.244	.357	**.752**	.168	.110	-.174	-5.111E-02
SUCCES2	.272	.240	**.715**	.363	.163	.154	-1.389E-03
SUCCES3	.222	.254	**.764**	.196	8.706E-02	-6.857E-02	8.423E-02
SUCCES4	.204	.197	**.743**	.274	.186	.169	-3.101E-02
SUCCES5	.109	.341	**.801**	.193	9.602E-02	-5.248E-02	1.473E-02
SUCCES6	.253	.322	**.813**	.213	.116	-9.701E-02	-3.172E-03
Information quality (IS-SUCCESS)							
SUCCES7	.410	.318	**.709**	.185	.174	9.746E-02	3.570E-02
SUCCES8	.321	.323	**.805**	.121	5.522E-02	-2.487E-02	6.470E-02
SUCCES9	.356	.335	**.724**	.157	.141	.168	.165

SUCCES10	**.504**	.294	**.673**	.135	-1.810E-02	2.889E-02	.102
SUCCES11	.388	.342	**.746**	.177	4.853E-02	.132	5.481E-02
SUCCES12	.330	.386	**.759**	.112	6.951E-02	5.443E-02	3.601E-02
SUCCES13	.410	.371	**.759**	.130	.106	5.572E-02	7.982E-02
User satisfaction (IS-SUCCESS)							
SUCCES14	.447	.474	**.528**	.178	.223	5.599E-02	-4.461E-03
Individual impact (IS-SUCCESS)							
SUCCES15	.323	.454	.364	.265	.235	.370	-.243
Organizational impact (IS-SUCCESS)							
SUCCES16	.319	.380	.447	.232	.297	.367	-.212
Use (IS-SUCCESS)							
SUCCE_A2	-5.106E-02	4.150E-02	-2.436E-02	5.772E-02	5.253E-02	2.865E-02	.275
SUCCE_A5	-1.873E-02	-1.658E-03	-5.562E-02	2.484E-02	5.787E-02	.113	**-.521**
SUCCE_A8	-.146	2.214E-03	-7.263E-02	9.992E-02	8.350E-03	-5.409E-02	-.340

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization; rotation converged in 9 iterations.
Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalues: 47.500, 3.497, 2.710, 2.304, 1.654, 1.368, and 1.162

Table 29

Final Factor Analysis for ISA

	1. Dependability	2. Technical Quality	3. Commitment	4. Interaction
Reliability (IS-SEVQUAL)				
SERVQ1	**.776**	.395	.293	.136
SERVQ2	**.826**	.292	.326	.199
SERVQ3	**.740**	.333	.355	.119
SERVQ4	**.781**	.368	.303	.219
SERVQ5	**.789**	.280	.348	.216
Competence (IS-SEVQUAL)				
SERVQ10	**.598**	.409	.344	.325
SERVQ11	**.595**	.416	.344	.291
Responsiveness (IS-SEVQUAL)				
SERVQ12	**.702**	.243	.169	.480
SERVQ13	**.648**	.216	.242	.474
SERVQ14	**.680**	.274	.290	.424
SERVQ16	**.661**	.323	.436	.340
SERVQ17	**.715**	.301	.309	.425
Timeliness (IS-SEVQUAL)				
SERVQ18	**.758**	.312	.309	.296
SERVQ19	**.728**	.395	.365	.214
SERVQ20	**.717**	.346	.388	.211
SERVQ21	**.673**	.362	.372	.330
SERVQ22	**.706**	.314	.405	.321
Communications (IS-SEVQUAL)				
SERVQ23	.467	.209	**.575**	.374
SERVQ27	.398	.312	.357	**.576**
Training (IS-SEVQUAL)				

SERVQ29	.424	.342	**.711**	.114
SERVQ30	.384	.379	**.740**	.191
SERVQ31	.421	.368	**.614**	.262
SERVQ32	.406	.407	**.697**	.229
SERVQ33	.361	.405	**.737**	.196
Empathy (IS-SEVQUAL)				
SERVQ34	.342	.382	**.745**	.218
SERVQ35	.330	.319	**.550**	.478
SERVQ36	.144	.385	**.568**	.493
SERVQ37	.366	.361	**.552**	.487
SERVQ39	.370	.326	**.646**	.387
Attitude (IS-SEVQUAL)				
SERVQ40	.306	.357	**.684**	.391
SERVQ41	.333	.312	**.725**	.303
SERVQ42	.316	.350	**.742**	.247
SERVQ43	.360	.331	**.739**	.242
SERVQ44	.350	.333	**.671**	.358
Relationships (IS-SEVQUAL)				
SERVQ46	.278	.379	.354	**.676**
SERVQ47	.354	.182	.285	**.799**
SERVQ48	.349	.209	.278	**.796**
SERVQ49	.342	.330	.305	**.725**
Access (IS-SEVQUAL)				
SERVQ50	.293	**.609**	.297	.330
System Quality (IS-SUCCESS)				
SUCCES1	.270	**.753**	.333	.210
SUCCES2	.321	**.737**	.223	.330
SUCCES3	.241	**.773**	.247	.215
SUCCES4	.248	**.771**	.185	.273
SUCCES5	.141	**.823**	.320	.208
SUCCES6	.272	**.824**	.302	.238
Information Quality (IS-SUCCESS)				
SUCCES7	.436	**.717**	.313	.191
SUCCES8	.337	**.801**	.311	.136
SUCCES9	.386	**.720**	.343	.157
SUCCES11	.408	**.740**	.330	.172
SUCCES12	.345	**.758**	.373	.131
SUCCES13	.430	**.756**	.361	.146
User satisfaction (IS-SUCCESS)				
SUCCES14	.493	**.544**	.445	.208

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization; rotation converged in 8 iterations.
Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalues: 36.277; 3.047; 2.294; 1.789

There are several reasons why this study used the rule of thumb of retaining items with a loading number greater than 0.5 for one factor, and less than 0.5 for all others. First, if the loading rule chosen were a more stringent loading number greater than 0.5 for

one factor, and less than 0.3 for all others in the study, the result would be to retain only two items. The two retained items were SERVQ47 and SUCCES3 and result in only one factor, as shown Table 30. Such a result does not support the original proposed theory and the theory fits the less stringent 0.5 and 0.5 rule better. In addition, this study is a preliminarily work and the one data set with its associated small sample size is not appropriately definitive for drastic item removal (all but two items) required for consistencies with the 0.5 and 0.3 rule. Furthermore, the current theory does not suggest that each of the dimensions are independent and therefore item removal to create independent measures as are achieved using the 0.5 and 0.3 rule approach is not warranted. Other alternative cut off values such as a 0.5 and 0.4 rule may be another approach and merits consideration for future studies.

Myers, Kappelman, and Prybutok's (1998) Comprehensive IS Assessment Model shows what could be termed three layers to the model - quality, use and user satisfaction. However, explanatory factor analysis on the ISA instrument forcing three factors produced three different dimensions (Dependability, Commitment, and Technical quality), but these three were not aligned with the theory. Because the results were not consistent with the theoretical expectations, the 0.5 and 0.5 rule along with Eigenvalues greater than one for generating the factors was deemed most appropriate.

Table 30

Final Factor Analysis for ISA by Using the 0.5 and 0.3 Rule

	Factor
	1
SERVQ47	**.643**
SUCCES3	**.643**

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization; rotation converged in 8 iterations.

Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.3 on all others.

Second, the factor analysis extracted only one factor with an eigenvalue greater than 1 on the instruments of ITG. Presumptively, the ITG dimensions consist of planning and organization, acquisition and implementation, delivery and support, and monitoring which correspond to the goals of the City of Denton project. However, the results of factor analysis for ITG only load one factor, which may indicate that the four dimensions have high correlations and consistency to measure the IT governance issues. The results only load one factor and that is also the creator's intent. A summary of the factor analysis for ITG is shown in Table 31 and 32.

Table 31

Initial Factor Analysis for ITG

	Factor	
	1	2
Planning & organization (ITG)		
ITG17	**.844**	.376
ITG18	**.884**	.296
ITG19	**.906**	.320
ITG20	**.882**	.209
ITG21	**.887**	.299
Monitoring (ITG)		
ITG22	**.807**	.336
Acquisition & implementation (ITG)		
ITG23	**.813**	.353
ITG24	**.689**	**.615**
ITG25	**.762**	**.619**
ITG26	**.693**	**.599**
Delivery & support (ITG)		
ITG27	-8.984E-03	-4.526E-02

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization; rotation converged in 3 iterations.
Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalue: 8.438 and 1.017

Table 32

Final Factor Analysis for ITG

	1. IT Governance based on ITG
ITG17	**.916**
ITG18	**.923**
ITG19	**.954**
ITG20	**.878**
ITG21	**.929**
ITG22	**.872**
ITG23	**.882**
ITG24	**.883**
ITG25	**.948**
ITG26	**.883**

Extraction Method: Principal Axis Factoring.
One factor extracted. 4 iterations required.
Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalue: 8.404

Third, the factor analysis extracted only one factor with an eigenvalue greater than 1 on the instruments of IS-ALIGN. After the varimax rotation was performed, all of the items tended to load onto the same dimension. Presumptively, the IS-ALIGN instrument includes the first five items of the MBNQA categories: Leadership, Strategic Planning, Customer and Market Focus, Information and Analysis, and Human Resource Focus. However, the result of the IS-ALIGN instrument only loads one factor and that is also the creator's intent. Thus, the items of the IS-ALIGN instrument are consistent and have high correlations. A summary of the factor analysis for IS-ALIGN is shown in Table 33.

Table 33

Initial and Final Factor Analysis for IS-ALIGN

	Factor
	1
Leadership (IS-ALIGN)	
ALIGN1	**.840**
ALIGN2	**.901**
ALIGN3	**.876**
ALIGN5	**.878**
ALIGN6	**.877**
ALIGN7	**.901**
ALIGN8	**.922**

ALIGN9	**.883**
Strategic planning (IS-ALIGN)	
ALIGN4	**.906**
ALIGN10	**.868**
ALIGN11	**.903**
ALIGN12	**.869**
ALIGN13	**.926**
Customer & market focus (IS-ALIGN)	
ALIGN14	**.913**
ALIGN15	**.893**
ALIGN16	**.903**
Information & analysis (IS-ALIGN)	
ALIGN17	**.867**
ALIGN18	**.918**
ALIGN19	**.911**
Human resource (IS-ALIGN)	
ALIGN20	**.900**

Extraction Method: Principal Axis Factoring.
1 factor extracted. 3 iterations required.

Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalue: F1= 16.153

Finally, the factor analysis extracted 2 factors with Eigenvalues greater than 1 on the instruments of EGOV. After the varimax rotation was performed, the items pertaining to system and data tended to load onto the same dimension, applications, while items pertaining to planning loaded as a separate dimension. A summary of the factor analysis for E-government Readiness is shown in Table 34 and 35.

Table 34

Initial Factor Analysis for EGOV (Part C2 Q39-51)

	Factor	
	1	2
Planning level (EGOV)		
EGOV39	.375	**.765**
EGOV40	.322	**.786**
EGOV41	.250	**.598**
EGOV42	.369	**.818**
System level (EGOV)		
EGOV43	**.653**	**.619**
EGOV44	**.750**	**.501**
EGOV45	**.761**	.422

EGOV46	**.789**	.391
Data level (EGOV)		
EGOV47	**.876**	.306
EGOV48	**.881**	.350
EGOV49	**.827**	.352

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization; rotation converged in 3 iterations.
Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalues: 7.746 and 1.133

Table 35

Final Factor Analysis for EGOV (Part C2 Q39-51)

	1. Applications	2. Planning
Planning		
EGOV39	.369	**.767**
EGOV40	.320	**.804**
EGOV41	.247	**.593**
EGOV42	.365	**.819**
System		
EGOV45	**.727**	.423
EGOV46	**.768**	.394
Data		
EGOV47	**.896**	.312
EGOV48	**.897**	.358
EGOV49	**.833**	.362

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization; rotation converged in 3 iterations.
Loading rule: Choose loading number greater than 0.5 on one factor, and less than 0.5 on all others.
Eigenvalues: 6.157; 1.117

Therefore, the e-government readiness model consists of four constructs (i.e., ISA, ITG, IS-ALIGN, and EGOV), and eight observed variables (i.e., dependability, technical quality, commitment, interaction, ITG, IS-ALIGN, application, and planning.). When running the data through the LISREL program, ITG and IS-ALIGN were regarded as observed variables, not constructs because both of them only contain a single indicator.

Moreover, it may be not desirable for strong relationships to exist among these dimensions in the ISA and EGOV instruments, so it is necessary to investigate the degree of multicollinearity. While it is known that the presence of a high degree of

multicollinearity among these dimensions will result in several problems (Dielman, 1996), this work did not develop independent measures and some degree of multicollinearity is anticipated. Problems when multicollinearity is present include the following: first, null hypotheses, that the coefficients are zero may be accepted even when the associated dimension is important in explaining variation in the dependent construct, and second, because of the high standard errors, reliable estimates will be difficult to obtain; signs of the coefficients may be the opposite of what is intuitively reasonable. Because multicollinearity exists when these dimensions are highly correlated, these correlations should help to identify any highly correlated pairs of dimensions (see Table 36 and 37) (Dielman, 1996). One rule of thumb suggested by some researchers is that multicollinearity exists if any pairwise correlation is bigger than 0.75. The pairwise correlations of dependability and technical quality, dependability and commitment, technical quality and commitment, and commitment and interaction are greater than 0.75 in Table 32 of correlations for ISA, so these dimensions identify pairwise multicollinearity. The correlations for e-government readiness in Table 33 do not have multicollinearity, because the pairwise correlations are smaller than 0.75.

One potential solution to the multicollinearity problem is to remove those dimensions that are highly correlated with others and thus eliminate the problem (Dielman, 1996). However, in some cases, adding more data can break the pattern of multicollinearity. Therefore, this study did not remove any dimensions despite their high degree of correlation because of the following two reasons: first, some degree of dependence is anticipated among the dimensions in the ISA instrument, and second, the sample size and single organization used in this work precludes over taking actions that

might limit future work. The multicollinearity issues in this study may be indicative of a limitation and merits further investigation.

Table 36

Correlations for ISA

		Dependability	Technical quality	Commitment	Interaction
Dependability	Pearson Correlation	1.000	.784**	.836**	.739**
	Sig. (2-tailed)	.	.000	.000	.000
	N	144	131	116	136
Technical quality	Pearson Correlation	.784**	1.000	.825**	.659**
	Sig. (2-tailed)	.000	.	.000	.000
	N	131	226	139	208
Commitment	Pearson Correlation	.836**	.825**	1.000	.784**
	Sig. (2-tailed)	.000	.000	.	.000
	N	116	139	145	143
Interaction	Pearson Correlation	.739**	.659**	.784**	1.000
	Sig. (2-tailed)	.000	.000	.000	.
	N	136	208	143	234

** Correlation is significant at the 0.01 level (2-tailed).

Table 37

Correlations for E-government Readiness

		Applications	Planning
Applications	Pearson Correlation	1.000	.681**
	Sig. (2-tailed)	.	.000
	N	112	107
Planning	Pearson Correlation	.681**	1.000
	Sig. (2-tailed)	.000	.
	N	107	159

** Correlation is significant at the 0.01 level (2-tailed).

Reliability and Validity of the E-government Readiness Instrument

This study uses the reliability model Cronbach's alpha, which is a model of internal consistency, based on the average inter-item correlation. Alpha scores of the e-government readiness model are shown in Table 38. All of the Cronbach's Alpha results

exceed the 0.80 recommended alpha value (Nunnally, 1978). Therefore, the reliability of these constructs and dimensions is positively acceptable.

Table 38

Cronbach's Alpha Scores of the E-government Readiness Model

Constructs	Cronbach's Alpha	Dimensions	N of Questions	Cronbach's Alpha
ISA	0.9575	Dependability	SV1-5, 10-14, 16-22	0.9857
		Technical Quality	SV50, SU1-9, 11-14	0.9784
		Commitment	SV23, 29-37, 39-44	0.9835
		Interaction	SV27, 46-49	0.9516
ITG	0.9554	ITG	CB17-26	0.9785
IS-ALIGN	0.9874	IS-ALIGN	AL1-20	0.9874
EGOV	0.9560	Applications	EG45-49	0.9563
		Planning	EG39-42	0.8910

Convergent validity of the e-government readiness model is checked by measuring the extent each item correlated with items in the same factor or dimension. For the scores of this model, all correlations are significant at the alpha = 0.01 level. All correlations among these dimensions are higher than 0.46, with correlations ranging from 0.47 to 0.94 (see Table 39). These results suggest that these scores exhibit convergent validity, because of high correlations among items within each factor. Convergent validity refers to how well different scale items indicate the same constructs, and how well multiple measures of the same construct agree with each other (Kerlinger, 1986).

Table 39

Significant Level of Correlations in the E-government Readiness Model

Constructs	Dimensions	N of Questions	Correlations range	Significant level
ISA	Dependability	SV1-5, 10-14, 16-22	(0.603, 0.921)	0.01 (2-tailed)
	Tech Quality	SV50, SU1-9, 11-14	(0.600, 0.933)	0.01 (2-tailed)
	Commitment	SV23, 29-37, 39-44	(0.632, 0.893)	0.01 (2-tailed)
	Interaction	SV27, 46-49	(0.710, 0.916)	0.01 (2-tailed)
ITG	ITG	CB17-26	(0.731, 0.941)	0.01 (2-tailed)
IS-ALIGN	IS-ALIGN	AL1-20	(0.631, 0.939)	0.01 (2-tailed)
EGOV	Applications	EG45-49	(0.712, 0.888)	0.01 (2-tailed)

	Planning	EG39-42	(0.469, 0.836)	0.01 (2-tailed)

Item-total correlations for the scores of the e-government readiness model range from 0.47 to 0.94, with 85 of 89 items greater than 0.60. These correlations are all higher than the recommended 0.35 cutoff (Saxe & Weitz, 1982). These results suggest that the scores of this model possess internal consistency and content validity. Therefore, the scores of the e-government readiness model exhibit higher reliability and validity.

ITG versus ISA

Hypothesis 1 states that IT governance (ITG) impacts IS. A path analysis by the LISREL program was performed on both of the partial and entire e-government readiness model. First, using ISA as the dependent construct and ITG as the independent construct in the partial model, the result did not converge because the solution was found non-admissible after 50 iterations. Second, using EGOV as the dependent construct, and ISA, ITG, and IS-ALIGN as the independent constructs in the entire model, based on the modified model (I) in Chapter 4, the results come up with t = 4.45, standard deviation = 1.31, and standard ? = 5.83 and, in turn, reject H1. Therefore, ITG predicts ISA well in the entire model, but when ITG predicts ISA alone, it does not have significant impact. This finding suggests that it may be better to use ITG along with IS-ALIGN and EGOV to measure ISA, i.e., controlling business objectives for IT impacts ISA positively in the entire e-government model, not in the partial model.

IS-ALIGN versus ISA

Hypothesis 2 states that the organization-IS alignment (IS-ALIGN) impacts IS. A path analysis by the LISREL program was performed on both of the partial and entire e-

government readiness model, based on the modified model (I). First, using ISA as the dependent construct and IS-ALIGN as the independent construct in the partial model, the result displays a good fit to data (X^2=0.18, df=5, p-value=0.99934, RMSEA=0.000) and is shown in Figure 20. Second, using EGOV as the dependent construct, and ISA, ITG, and IS-ALIGN as the independent constructs in the entire model, the results come up with t = -2.67, standard deviation = 0.50, and standard estimate ? = -1.34 and, in turn, rejects H1. Therefore, IS-ALIGN predicts ISA well in both of the models. This finding suggests that organization-IS alignment has a positive impact on IS.

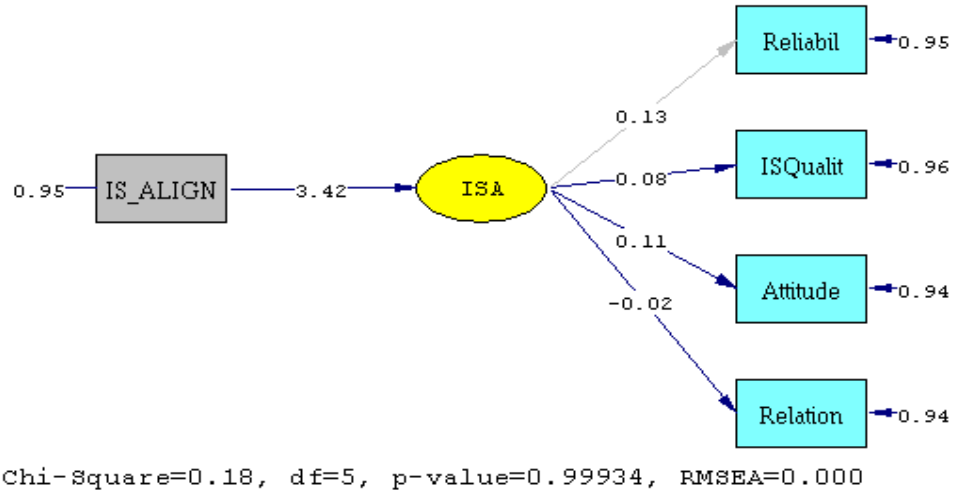


Figure 20. Path diagram of IS-ALIGN versus ISA in the partial model (The numbers of the paths represent coefficients ? .).

ISA versus EGOV

Hypothesis 3 states that IS impacts the readiness for e-government (EGOV). A path analysis using the LISREL program was performed on both of the partial and entire e-government readiness models, based on the modified model (I). First, using EGOV as the dependent construct and ISA as the independent construct in the partial model, the result displays a modest fit to data (X^2=8.49, df=8, p-value=0.38743, RMSEA=0.019)

and is shown in Figure 21. Second, using EGOV as the dependent construct, and ISA, ITG, and IS-ALIGN as the independent constructs in the entire model, the results come up with t = 3.94, standard deviation = 0.02, and standard estimate ? = 0.08 and, in turn, reject H1. Therefore, ISA predicts EGOV in the entire model directly, but a modest fit in the partial model. This finding suggests that IS impacts how an organization uses IT positively, especially in the entire model.

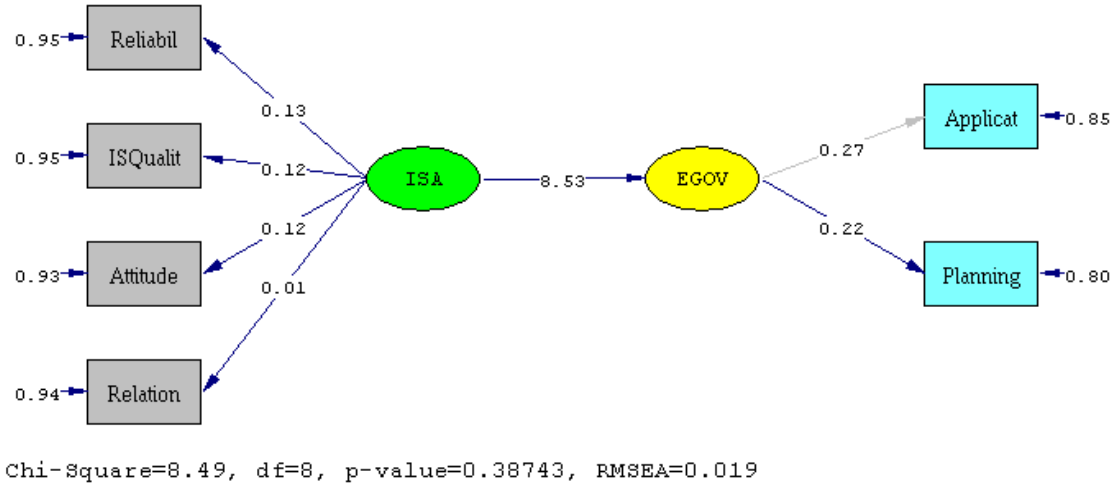


Figure 21. Path diagram of ISA versus EGOV in the partial model (The numbers of the paths represent coefficients ? .).

ITG versus IS-ALIGN

Hypothesis 4 states that there is a connection between IT governance (ITG) and organization-IS alignment (IS-ALIGN). A path analysis using the LISREL program is performed on both the partial and entire e-government readiness model. First, use ITG as the dependent construct and IS-ALIGN as the independent construct in the partial model, the result displays a perfect fit to data (X^2=0.00, df=0, p-value=1.00000, RMSEA=0.000) and is shown in Figure 22 below. Note that if IS-ALIGN is the dependent construct and ITG is the independent construct in the partial model, the result will stay the same.

Second, use EGOV as the dependent construct, and ISA, ITG, and IS-ALIGN as the independent constructs in the entire model, the results come up with t = 7.29, standard deviation = 0.09, and standard estimate ? = 0.64 and, in turn, reject H1. Therefore, ITG predicts IS-ALIGN or IS-ALIGN predicts ITG well in both of the models. This finding suggests that there is a connection between how an organization controls its objectives for IT, and how it aligns IT and the business, positively.

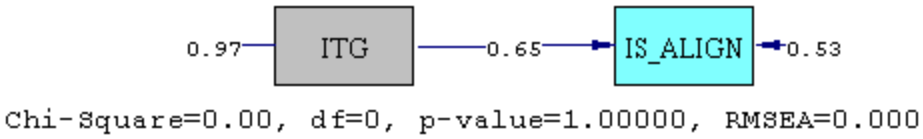


Figure 22. Path diagram of ITG versus IS-ALIGN in the partial (The numbers of the paths represent coefficients ? .).

IS-ALIGN versus EGOV

Hypothesis 5 states that the organization-IS alignment (IS-ALIGN) impacts the readiness for e-government (EGOV). A path analysis using the LISREL program was performed on both of the partial and entire e-government readiness model, based on the modified model (I). First, use EGOV as the dependent construct and IS-ALIGN as the independent construct in the partial model, the result displays a perfect model fit (X^2=0.00, df=0, p-value=1.00000, RMSEA=0.000) and is shown in Figure 23 below. Second, using EGOV as the dependent construct, and ISA, ITG, and IS-ALIGN as the independent constructs in the entire model, the results come up with t = 4.55, standard deviation = 0.21, and standard estimate ? = 0.95 and, in turn, reject H1. Therefore, IS-ALIGN predicts EGOV positively in both of the models. This finding suggests that organization-IS alignment impacts how an organization uses IT positively.

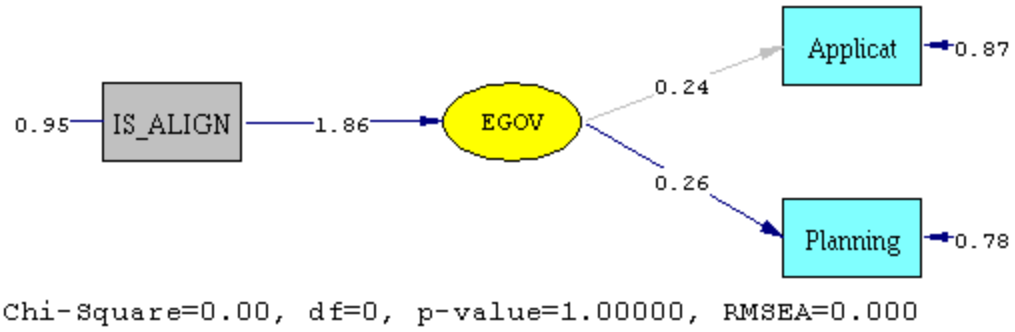


Figure 23. Path diagram of IS-ALIGN versus EGOV in the partial model (The numbers of the paths represent coefficients ? .).

ITG versus EGOV

Hypothesis 6 states that IT governance (ITG) impacts the readiness for e-government (EGOV). A path analysis using the LISREL program was performed on both the partial and entire e-government readiness model, based on the modified model (II). First, using EGOV as the dependent construct and ITG as the independent construct in the partial model, the result displays a perfect fit to data (X^2=0.00, df=0, p-value=1.00000, RMSEA=0.000) and is shown in Figure 24 below. Second, using EGOV as the dependent construct, and ISA, ITG, and IS-ALIGN as the independent constructs in the entire model, the results come up with t = 4.36, standard deviation = 0.19, and standard estimate ? = 0.85 and, in turn, reject H1. Therefore, ITG predicts EGOV positively in both of the models. This finding suggests that controlling business objectives for IT have impact on how an organization uses IT, positively.

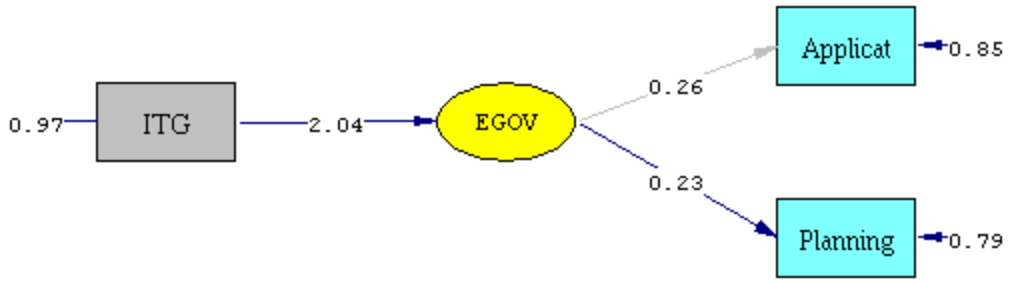


Figure 24. Path diagram of ITG versus EGOV in the partial model (The numbers of the paths represent coefficients ? .).

Confirmatory Factor Analysis (CFA)

In developing and conducting the CFA of this study, the research design followed the five stages characteristic of most applications of SEM, based on the suggestions of Bollen and Long (1993): (1) model specification, (2) identification, (3) estimation, (4) testing fit, and (5) respecification.

Model specification

The first step in operationalizing the e-government readiness model is to clarify exactly what relationships the model proposed, based on the literature review and EFA. Figure 17 presents the proposed theoretical e-government readiness model. The first construct of ISA is measured by four items and the second EGOV by two items. ITG and IS-ALIGN are observed constructs due to the single indicator pointing to each of them. There are two components to the SEM. First, the structural model specifies the predictive relationships among the latent constructs. Second, the measurement model defines how the latent constructs are measured (i.e., represented by indicators). The structural model is based on the hypotheses that ISA impacts EGOV, ITG impacts ISA and EGOV, IS-ALIGN impacts ISA and EGOV, and IS-ALIGN and ITG impact each other. In addition, the structural relations use latent constructs; that is, each construct in the model is

represented by multiple indicators. Bollen (1989) has suggested that a CFA model should incorporate at least two indicators per latent construct. Therefore, when performing LISREL, EGOV and ISA are defined as constructs, however, ITG and IS-ALIGN, which only contain an indicator, respectively, are defined as indicators. The central hypothesis of the theoretical model is that ITG and IS-ALIGN mediate the relationships between ISA and EGOV, as the predictors, and EGOV as the outcome.

Based on the output of LISREL, the residuals, modification indices, expected changes, and standardized expected change provide information about the sources of the model's lack of fit. LISREL suggests that the fit of the original model would be improved substantially by allowing a path between applications and technical quality or a path between ITG and dependability. Therefore, the modified model (I) comes up with a good fit. Moreover, according to LISREL tests of the six partial models shown in EFA section, the modified model (II) comes up with a good fit by removing the ITG construct due to ITG->ISA not converging.

Identification

For CFA, issues of model identification typically are dealt with by default. That is, the latent constructs or constructs are hypothesized to "cause" the observed variables. The model is recursive in that the causal flow is expected to be from the latent constructs to the observed variables (Kelloway, 1998). The latent constructs are allowed to correlate, but error terms are uncorrelated.

Estimation

All model tests are based on the covariance matrix and used maximum likelihood (ML) estimation as implemented in the LISREL program. In Table 40 to 43, the output

from LISREL is divided into a number of sections: (1) the covariance matrix, (2) the maximum likelihood estimates, (3) the R^2 values for each variable as indications of how well the latent constructs explain the variance in the observed variables, and (4) the fit indices for the model. As shown in the tables, the modified models (I) and (II) contain low X^2 and high p-value which indicate better fit than the original theoretical model. For each endogenous variable in the model, LISREL calculates the R^2 value, which is interpreted exactly the same as R^2 values in regression.

Table 40

Covariance Matrix for E-government Readiness Model

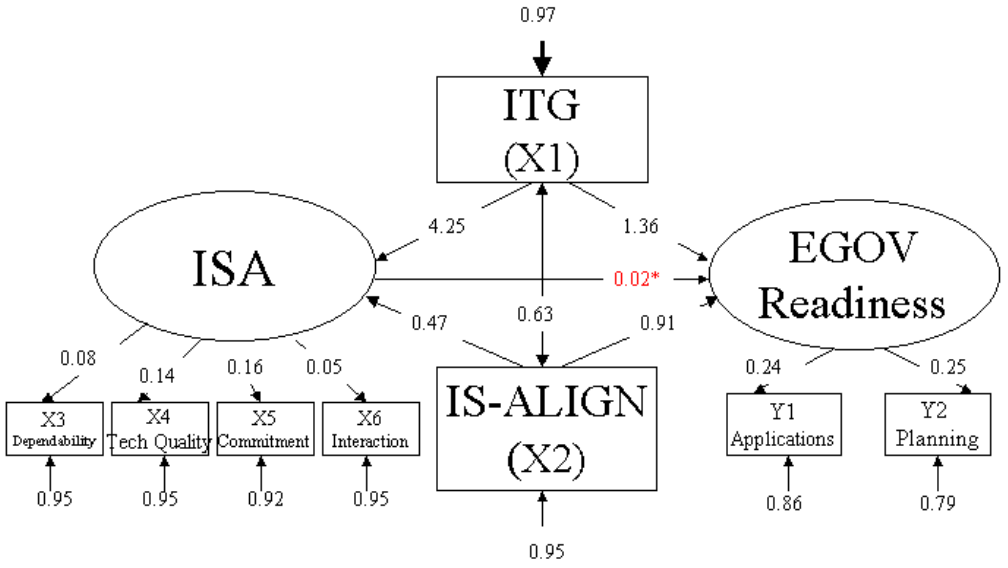
	Applications (Y1)	Planning (Y2)	ITG (X1)	IS-ALIGN (X2)	Dependability (X3)	Tech Quality (X4)	Commitment (X5)	Interaction (X6)
Applications (Y1)	0.92							
Planning (Y2)	0.06	0.85						
ITG (X1)	0.51	0.46	0.97					
IS-ALIGN (X2)	0.42	0.45	0.63	0.95				
Dependability (X3)	0.21	0.33	0.36	0.40	0.96			
Tech Quality (X4)	0.37	0.11	0.53	0.27	0.01	0.97		
Commitment (X5)	0.27	0.25	0.61	0.34	0.01	0.02	0.95	
Interaction (X6)	0.06	-0.01	0.19	-0.04	0.02	0.00	0.02	0.94

Table 41

LISREL Estimates and Path Diagram of Theoretical E-government Readiness Model

Equations	Error variance	Significant Level	R^2
Measurement Equations:			
Applicat = 0.24*EGOV	0.86	No	0.065
Planning = 0.25*EGOV	0.79	Yes	0.071
Dependa = 0.08*ISA	0.95	No	0.007
TechQualit = 0.14*ISA	0.95	Yes	0.020
Commit = 0.16*ISA	0.92	Yes	0.027
Interact = 0.05*ISA	0.93	Yes	0.003
Structural Equations:			
EGOV = 0.02*ISA + 1.36*ITG + 0.91*IS-ALIGN	-3.44	Yes	4.440
ISA = 4.25*ITG - 0.47*IS-ALIGN	-14.27	Yes	15.270
Reduced Form Equations:			
EGOV = 1.45*ITG + 0.90*IS-ALIGN	-3.45	Yes	4.450

ISA = 4.25*ITG - 0.47*IS-ALIGN	-14.27	Yes	15.270



Original model: Chi-Square=38.61, df=16, p-value=0.00124, RMSEA=0.091

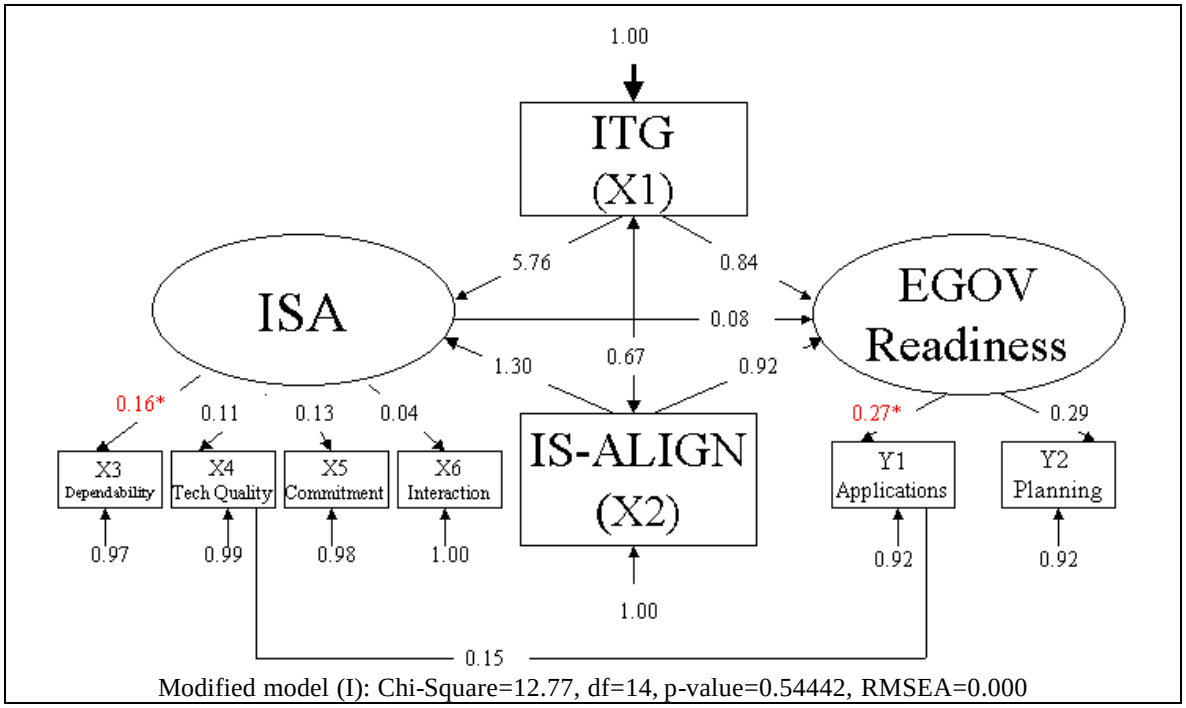
In the path analysis of the modified model (I) (see Table 42), ITG has a significant effect (standardized ? = 5.76) on ISA, and an effect (standardized ? = 0.84) on EGOV. ITG also has a bi-directional relationship (standardized ? = 0.67) with IS-ALIGN. IS-ALIGN has an effect (standardized ? = 1.30) on ISA, and an effect (standardized ? = 0.92) on EGOV. ISA has an effect (standardized ? = 0.08) on EGOV. ISA consists of the technical quality, commitment, and interaction dimensions significantly. EGOV consists of only the planning dimension significantly. Moreover, ITG has a direct effect on EGOV (0.84); plus an indirect effect on EGOV through ISA (5.76 x 0.08 = 0.46); plus an indirect effect on EGOV through IS-ALIGN (0.67 x 0.92 = 0.62). This totals 1.92. IS-ALIGN has a direct effect on EGOV (0.92); plus an indirect effect on EGOV through ISA (1.30 x 0.08 = 0.10); plus an indirect effect on EGOV through ITG (0.67 x 0.84 = 0.56). This totals 1.58. ISA has a direct effect on EGOV (0.08); plus a correlation between technical quality and applications (0.11 x 0.15 x 0.27 =

0.01). This totals 0.09. Comparatively, IS-ALIGN is about 18 times as important as ISA in affecting EGOV. ITG is over 21 times as important as ISA in affecting EGOV. ITG is also more important than IS-ALIGN (1.92-1.58 = 0.34) in affecting EGOV. The result of the path analysis suggests that ITG is more important than IS-ALIGN and ISA in affecting EGOV. The order of the importance in affecting EGOV is ITG, IS-ALIGN and ISA in the modified model (I). The result of LISREL estimates suggests that the best structural equation is EGOV = 1.33*ITG + 0.84*IS-ALIGN.

Table 42

LISREL Estimates and Path Diagram of Modified E-government Readiness Model (I)

Equations	Error variance	Significant Level	R^2
Measurement Equations:			
Applicat = 0.26*EGOV	0.85	No	0.075
Planning = 0.27*EGOV	0.78	Yes	0.084
Reliabil = 0.16*ISA	0.94	No	0.027
ISQualit = 0.11*ISA	0.95	Yes	0.013
Attitude = 0.12*ISA	0.93	Yes	0.016
Relation = 0.04*ISA	0.94	Yes	0.002
Structural Equations:			
EGOV = 0.08*ISA + 0.85*ITG + 0.95*IS-ALIGN	-2.64	Yes	3.64
ISA = 5.83*ITG - 1.34*IS-ALIGN	23.84	Yes	24.84
Reduced Form Equations:			
EGOV = 1.33*ITG + 0.84*IS-ALIGN	2.80	Yes	3.80
ISA = 5.83*ITG - 1.34*IS-ALIGN	23.84	Yes	24.84



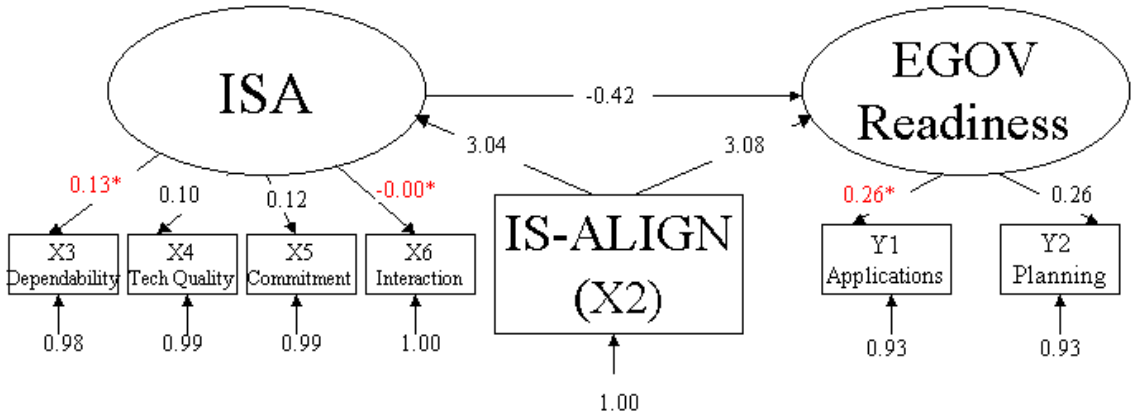
Modified model (I): Chi-Square=12.77, df=14, p-value=0.54442, RMSEA=0.000

In the path analysis of the modified model (II) (see Table 43), IS-ALIGN has an effect (standardized ? = 3.04) on ISA, and an effect (standardized ? = 3.08) on EGOV. ISA has an effect (? = -0.42) on EGOV. ISA consists of the technical quality and commitment dimensions significantly. EGOV only consists of the planning dimension significantly. Moreover, IS-ALIGN has a direct effect on EGOV (3.08), plus an indirect effect on EGOV through ISA (3.04 x (-0.42) = -1.31). This totals 1.86. ISA has a direct and negative effect on EGOV (-0.42). Comparatively, IS-ALIGN is over 4 times as important as ISA in affecting EGOV. The result of the path analysis suggests that IS-ALIGN is more important than ISA in affecting EGOV. The result of LISREL estimates suggests that the best structural equation is EGOV = 1.87*IS-ALIGN.

Table 43

LISREL Estimates and Path Diagram of Modified E-government Readiness Model (II)

Equations	Error variance	Significant Level	R^2
Measurement Equations:			
Applicat = 0.25*EGOV	0.86	No	0.067
Planning = 0.24*EGOV	0.79	Yes	0.069
Reliabil = 0.13*ISA	0.94	No	0.017
ISQualit = 0.10*ISA	0.96	Yes	0.010
Attitude = 0.12*ISA	0.93	Yes	0.014
Relation = - 0.00*ISA	0.94	Yes	0.000
Structural Equations:			
EGOV = - 0.42*ISA + 3.17*IS-ALIGN	-0.87	Yes	1.87
	-8.26	Yes	9.26
ISA = 3.13*IS-ALIGN			
Reduced Form Equations:			
EGOV = 1.87*IS-ALIGN	-2.30	Yes	3.30
ISA = 3.13*IS-ALIGN	-8.26	Yes	9.26



Modified model (II): Chi-Square=12.67, df=12, p-value=0.39322, RMSEA=0.018

Path analysis with observed variables is the oldest variety of SEM (Kelloway, 1998). The goal of path analysis is to test a "structural" model, that is, a model comprising theoretically based statements of relationships among constructs. The intent of the research is to predict the e-government readiness at the planning and application stages. In brief, the LISREL estimates and path diagram of modified model (I) suggest that the best predictor of e-government readiness is the impact of IT governance plus organization-IS alignment (R^2=3.8) via the inspection of comparing three models. Note

that two exogenous constructs (ITG and IS-ALIGN) are allowed to correlate freely. There are two endogenous constructs (ISA and EGOV). EGOV is predicted by ITG, IS-ALIGN, and ISA. ISA is predicted by ITG and IS-ALIGN. Because this is a path analysis using only observed variables, the LISREL model focuses only on the structural model. The measurement model is ignored.

Testing fit

1. Absolute fit. This e-government readiness model is based on eight variables and incorporates six main paths (i.e., including ITG and IS-ALIGN which are duplicate.). These eight variables also come up with eight measurement errors, respectively. Thus, the total is 20 paths in the theoretical e-government readiness model. The original model therefore has df = ½(8)(9)-20 = 16. The modified model (I) adds two correlations between ITG and IS-ALIGN, and applications and technical quality, so df = ½(8)(9)-22 = 14. The modified model (II) has df = ½(7)(8)-16 = 12.

(1) RMR. The standardized RMR has a lower bound of 0 and an upper bound of 1. Values less than 0.05 are interpreted as indicating a good fit to the data. The standardized RMR of this theoretical model is 0.07; however, it becomes 0.04 and 0.05 in the modified models. Thus, the modified versions of the e-government readiness model have a good model fit.

(2) RMSEA. Steiger (1990) suggests that values below 0.10 indicate a good fit to the data. Values below 0.01 indicate an outstanding fit to the data. The RMSEA of this original model in this study is 0.09, which indicates a “good” fit to the data; the RMSEA of the modified models becomes 0.00 and 0.02, which indicate the modified model (I) an outstanding fit to the data, and the modified model (II) is a good fit to the data.

(3) GFI. The goodness-of-fit index (GFI) is based on a ratio of the sum of the squared discrepancies to the observed variance. The GFI ranges from 0 to 1, with values exceeding 0.9 indicating a good fit to the data. The GFI of this original model in this study is 0.95; the GFI of the modified versions are 0.98 and 0.98. All of them indicate a good fit to the data.

(4) AFGI. The AFGI ranges from 0 to 1, with values above 0.9 indicating a good fit to the data. The AGFI of the original model is 0.88, the modified versions are 0.95 and 0.95. It indicates that the modified versions are much better than the original model.

2. Comparative Fit. Comparative fit deals with whether the model under consideration is better than some competing model. Several examples of indices of comparative fit are described as follows.

(1) NFI. The NFI ranges from 0 to 1, with values exceeding 0.9 indicating a good fit. The NFI of the three models of this study is 0.93, 0.98 and 0.94, which indicate all are good fits.

(2) NNFI. Higher values of the NNFI indicate a better fitting model, and it is common to apply the 0.90 rule as indicating a good fit to the data. The NNFI of the three models of this study is 0.92, 1.00 and 0.99, which indicate all are good fits.

(3) IFI. IFI values range between 0 and 1., with higher values indicating a better fit to the data. The IFI of the three models of this study is 0.96, 1.00 and 1.00, which indicate all are good fits.

(4) CFI. The CFI also ranges between 0 and 1, with values exceeding 0.90 indicating a good fit to the data. The CFI of the three models of this study is 0.96, 1.00 and 1.00, which indicate all are good fits.

(5) RFI. The ranges of the RFI are between 0 and 1, with values exceeding 0.90 indicating a good fit to the data. The RFI of the three models of this study is 0.88, 0.96 and 0.90. The modified models indicate a good fit to the data.

(6) ECVI. The ECVI has a lower bound of zero but no upper bound. Smaller values indicate better-fitting models. The ECVI of the three models of this study is 0.46, 0.34 and 0.26. The modified model (II) is the best among the three models.

3. Parsimonious Fit. Several of the indices can be calculated by adjusting other indices of fit for model complexity.

(1) PNFI. The PNFI ranges from 0 to 1, with higher values indicating a more parsimonious fit. The PNFI of the three models of this study is 0.53, 0.49 and 0.54. The modified model (II) is the best among the three models.

(2) PGFI. The PGFI ranges from 0 to 1, with higher values indicating a more parsimonious fit. The PGFI of the three models of this study is 0.42, 0.38 and 0.42. The modified model (I) has the worst fit.

(3) AIC and CAIC. Neither index is scaled to range between 0 and 1. Smaller values of the AIC and CAIC indicate a more parsimonious model, but there are no conventions or guidelines to indicate what "small" means. The model AIC of the three models of this study is 78.61, 56.77 and 44.67. The modified model (II) is the best among the three models. The model CAIC of the three models of this study is 161.44, 147.89 and 110.94. The modified model (II) is still the best among the three models.

In summary, assessing the model fit is based on (1) whether the modified models fit better than the original theoretical model, and (2) whether the model provides a good fit to the data (see Table 44). The original theoretical model falls in the category of a

"modest" fit to the data. That is, the RMSEA, GFI, NFI, NNFI, IFI, CFI, PNFI, and PGFI all indicate a good fit to the data; however, the X^2, P value, RMR, standardized RMR, AGFI, RFI, ECVI, and AIC all indicate that the original model is not a good fit to the data. The modified model (I) falls in the category of a "reasonable and outstanding" fit to the data. That is, the X^2, P value, RMR, standardized RMR, GFI, AGFI, NFI, NNFI, IFI, CFI, and RFI all indicate a good fit to the data; only the ECVI, PNFI, PGFI, AIC, and CAIC indicate that the modified model is not a good fit to the data. Moreover, the modified model (II) falls in the category of a "reasonable and good" fit to the data. That is, the RMR, standardized RMR, RMSEA, GFI, AGFI, NFI, NNFI, IFI, CFI, RFI, ECVI, PNFI, PGFI, AIC, and CAIC all indicate a good fit to the data; the X^2 and P value are close to the marginal.

Table 44

The Goodness of Fit Statistics for the E-government Readiness Model

Goodness of fit statistics	Criteria for good fit	Original model	Modified Model (I)	Modified Model (II)
1. Absolute Fit				
Degrees of Freedom (df)		16.00	14.00	12.00
Minimum Fit Function X^2	X^2 small; P above 0.5	40.90 (P=0.00058)	**13.01 (P=0.53)**	12.74 (P=0.39)
Normal Theory Weighted Least Squares X^2	X^2 small; P above 0.5	38.61 (P=0.00120)	**12.77 (P=0.54)**	12.67 (P=0.39)
Estimated Non-centrality Parameter (NCP)		22.61	0.00	0.67
90% Confidence Interval for NCP		(8.13; 44.78)	(0.0; 11.14)	(0.0; 13.51)
Minimum Fit Function Value		0.24	0.08	0.08
Population Discrepancy Function Value (F0)		0.13	0.00	0.00
90% Confidence Interval for F0		(0.05; 0.26)	(0.0; 0.07)	(0.0; 0.08)
Critical N (CN)		134.02	381.71	350.85
Root Mean Square Residual (RMR)	Below 0.05	0.07	**0.04**	**0.04**
Standardized RMR	Below 0.05	0.07	**0.04**	0.05
Root Mean Square Error of Approximation (RMSEA)	Below 0.10	**0.09**	**0.00**	**0.02**
90% Confidence Interval for RMSEA		(0.06; 0.13)	(0.0; 0.07)	(0.0; 0.08)
p-value for Test of Close Fit (RMSEA<0.05)	Large	0.03	**0.85**	**0.73**
Goodness of Fit Index (GFI)	Above 0.9	**0.95**	**0.98**	**0.98**

Adjusted Goodness of Fit Index (AGFI)	Above 0.9	0.88	**0.95**	**0.95**
2. Comparative fit				
Normed Fit Index (NFI)	Above 0.9	**0.93**	**0.98**	**0.94**
Non-Normed Fit Index (NNFI)	Above 0.9	**0.92**	**1.00**	**0.99**
Incremental Fit Index (IFI)	Above 0.9	**0.96**	**1.00**	**1.00**
Comparative Fit Index (CFI)	Above 0.9	**0.96**	**1.00**	**1.00**
Relative Fit Index (RFI)	Above 0.9	0.88	**0.96**	**0.90**
Expected Cross-Validation Index (ECVI)	Small	0.46	0.34	**0.26**
90% Confidence Interval for ECVI	Small	(0.38; 0.59)	(0.34; 0.41)	(0.26; 0.34)
ECVI for Saturated Model	Small	0.42	0.42	**0.33**
ECVI for Independence Model	Small	3.60	3.60	**1.37**
X^2 for Independence (Null) Model	Small	596.78 (df=28)	596.78 (df=28)	**218.36 (df=21)**
3. Parsimonious Fit				
Parsimony Normed Fit Index (PNFI)	Large	**0.53**	0.49	**0.54**
Parsimony Goodness of Fit Index (PGFI)	Large	**0.42**	0.38	**0.42**
Independence AIC	Small	612.78	612.78	**232.36**
Model AIC	Small	78.61	56.77	**44.67**
Saturated AIC	Small	72.00	72.00	**56.00**
Independence CAIC	Small	645.91	645.91	**261.35**
Model CAIC	Small	161.44	147.89	**110.94**
Saturated CAIC	Small	221.10	221.10	**171.97**

*The bold font means an acceptable fit to the data based on the criteria for a good fit of the second column.

Model modification

In order to improve the fit of the original theoretical model, given that all the estimated parameters are significant, theory trimming (i.e., deleting nonsignificant paths) seems to be a viable option (Pedhazur, 1982). Theory building (i.e., adding parameters based on the empirical results) also remains an option. The original model provides a poor fit to the data (i.e., X^2=38.61, df=16, p-value=0.00124, RMSEA=0.091). Adding the path of the correlation of applications and technical quality improves the fit of the model (i.e., X^2=12.77, df=14, p-value=0.54442, RMSEA=0.000), and the modified model (I) becomes a "reasonable and outstanding" fit to the data. Moreover, removing an observed variable, ITG, also improves the fit of the model (i.e., X^2=12.67, df=12, p-value=0.39322, RMSEA=0.018) and the modified model (II) becomes a "reasonable and

good" fit to the data. Thus, the results of model modification in this study suggest two good fit models, the modified model (I) and the modified model (II), for further studies.

CHAPTER 6

CONCLUSION

A discussion of the findings in the dissertation work and problems encountered are presented in this chapter. Six hypotheses were posed to address the research objectives of this dissertation. Results and support for these hypotheses are summarized and discussed in this chapter. Recommendations for future research, a discussion of the implications of the study, and contribution to literature conclude the chapter.

Summary of the Study

The purpose of this study is to test different instruments of ISA, ITG, and IS-ALIGN to examine their ability to measure the readiness for e-government. The ISA instrument is based on IS-SERVQUAL developed by Van Dyke, Kappelman, and Pybutok (1997), and IS-SUCCESS developed by Kappeman and Chong (2001) on the COD project from UNT. The IS Success model was invented by DeLone and McLean (1992), but they did not test this model then. The ITG instrument is based on the goals of the COD project for IT governance developed by Sanchez and Kappelman (2001) from UNT. The goals of the COD project include an examination of the policies, procedures, and processes by which IT decisions are made. The IS-ALIGN instrument was developed by Sanchez and Kappelman (2001) for the COD project based on the MBNQA instrument to measure how effectively the government utilizes IT to support various business objectives. The EGOV instrument is adapted from the study of the Action-Audience Model developed by Koh (2001) to measure how well the government is prepared to usher in e-government in terms of various success factors at planning, system and data levels.

An on-line survey was conducted at Denton, Texas. An invitation letter for the survey was sent out to the 1100 employees of the City of Denton via email, 339 responses were received, yielding a response rate of 31%. About 168 responses were discarded because they were incomplete, up to 20% of them missing values, leaving 171 usable surveys, or a final response rate of 16%. The survey was taken by an almost equal number of male (48%) and female (49%) respondents. The average age of the respondents was 40. About half of the respondents had a degree from a four-year college or higher. About half of the respondents held a managerial or professional positions. On average, the respondents worked over 40 hours per week and utilized IT for about 25 hours for an IT dependency ratio of 58%, which is defined as the number of hours per week for which the employee utilizes IT divided by the total number of weekly work hours. These results suggest the respondents in this study were well qualified to rate the readiness for e-government at their location.

Summary of the Findings

A number of findings related to IS, IT governance, organization-IS alignment, and readiness for e-government are identified in this study. The findings are summarized for each hypothesis that is investigated in this study.

Hypothesis 1: IT governance impacts IS (i.e., ITG -> ISA).

Results of this study indicate partial support for hypothesis 1. The partial support means that if the hypothesis exists, it needs to meet certain conditions. The findings of this study indicate that ITG impacts IS. It only exists in the entire model that contains other constructs such as IS-ALIGN and EGOV based on the modified e-government model (II). The impact from ITG to IS is especially on technical quality, the commitment

of the staff to support user involvement, and the interaction of the customers and staff. If ITG predicts IS alone without other constructs, the hypothesis will not be held.

Hypothesis 2: Organization-IS alignment impacts IS (i.e., IS-ALIGN -> ISA).

Results of this study indicate strong support for hypothesis 2. The findings of this study indicate that IS-ALIGN predicts ISA well in both of the entire and partial models. This finding suggests that organization-IS alignment has impact on IS, directly. The impact from organization-IS alignment to IS is especially on technical quality, the commitment of the staff to support user involvement, and the interaction of the customers and staff.

Hypothesis 3: IS impacts the readiness for e-government (i.e., ISA -> EGOV).

Results of this study indicate support for hypothesis 3. The findings of this study indicate that ISA predicts EGOV in the entire model, but is a modest fit in the partial model. This finding suggests that IS has impact on how an organization uses IT directly, especially in the entire model with ITG and ALIGH constructs together. The scope of IS consists of IS service quality, the commitment of the staff to support user involvement, and the interaction of the customers and staff. The scope of readiness for e-government is assessed at the planning and application levels.

Hypothesis 4: There a connection between IT governance and organization-IS alignment (i.e., ITG <-> IS-ALIGN).

Results of this study indicate strong support for hypothesis 4. ITG predicts IS-ALIGN or IS-ALIGN predicts ITG well in both of the entire and partial models. The finding of this study suggests that there is a connection between how an organization controls its objectives for IT, and how it aligns IT and the business, directly. Another

finding of this study is that ITG and IS-ALIGN have correlated and bi-directional relationships, rather than a causal relationship.

Hypothesis 5: Organization-IS alignment impacts the readiness for e-government (i.e., IS-ALIGN -> EGOV).

Results of this study indicate strong support for hypothesis 5. The findings of this study indicate that IS-ALIGN predicts EGOV positively in both the entire and partial models. The finding suggests that organization-IS alignment impacts how an organization uses IT positively. The scope of readiness for e-government is assessed at the planning and application levels.

Hypothesis 6: IT governance impacts the readiness for e-government (i.e., ITG ->EGOV).

Results of this study indicate strong support for hypothesis 6. The findings of this study indicate that ITG predicts EGOV positively in both of the entire and partial models. The finding suggests that controlling business objectives for IT have impact on how an organization uses IT directly. The scope of readiness for e-government is assessed at the planning and application levels. The summary of support for hypotheses is shown in Table 41.

In the partial model testing on Page 113, using ISA as the dependent construct and ITG as the independent construct, the result did not converge, as shown in Table 45, because the solution was found non-admissible after 50 iterations. Based on Figure 20, the path diagram of IS-ALIGN versus ISA in the partial model, the result displayed p-value=0.999934 and RMSEA=0.000. This was considered a good fit and was labeled as such in Table 45. In Figure 21 of the path diagram of ISA versus EGOV in the partial

model, the result displayed p-value=0.38743 and RMSEA=0.019. This was considered a modest fit and was labeled as such in Table 45. In Figure 22, 23, 24 of the path diagrams of ITG versus IS-ALIGN, IS-ALIGN versus EGOV, and ITG->EGOV in the partial models, the results all displayed p-value=1.0 and RMSEA=0.000. This was considered a perfect fit and was labeled as such in Table 45. To summarize, Perfect fit is p-value=1.0 and RMSEA=0.000; Good fit is 1>p-value>0.5 and RMSEA=0.000; Modest fit is p-value<0.5 and RMSEA>0.000; and Not converged is unable to fit. The Conclusion column is the average of the results of the Entire Model and the Partial Model columns.

Table 45

Summary of Support for Hypotheses

Hypothesis	Entire Model (i.e., Modified I)	Partial Model	Conclusion
1. IT governance impacts IS. (ITG->ISA)	Reject H_0 & Accept H_1	Not converged	Partial support
2. Organization-IS alignment impacts IS. (IS-ALIGN->ISA)	Reject H_0 & Accept H_1	Good fit	Strong support
3. IS impacts the readiness for e-government. (ISA->EGOV)	Reject H_0 & Accept H_1	Modest fit	Support
4. There a connection between IT governance and organization-IS alignment. (ITG->IS-ALIGN)	Reject H_0 & Accept H_1	Perfect fit	Str1ong support
5. Organization-IS alignment impacts the readiness for e-government. (IS-ALGIN->EGOV)	Reject H_0 & Accept H_1	Perfect fit	Strong support
6. IT governance impacts the readiness for e-government. (ITG->EGOV)	Reject H_0 & Accept H_1	Perfect fit	Strong support

Limitations of the Research

The primary problem encountered in this study is the small sample size of the Web-based survey. Both estimation methods (e.g., maximum likelihood) and tests of model fit (e.g., X^2 test) in LISREL are based on the assumption of large samples. According to Kelloway's (1998) definition of "large," a sample size of at least 200

observations would be an appropriate minimum. The valid data in this study is 171 cases, which is lower than the basic sample requirement of SEM.

The respondents needed to dedicate approximately three 1-hour sessions of work time to complete the survey. The length of the questionnaire may have led to answers that were less valid due to fatigue or the unwillingness of participants to seriously answer the large number of questions. In addition, about half of the respondents in this study held a managerial or professional position and are working on deadlines, and may have felt their time was too valuable to fill out the survey.

Low response rates are often a limitation of surveys, and a response rate greater than 30% is rare (Alreck & Settle, 1985), especially on a Web-based survey. Many surveys encourage higher response rates through financial incentives. However, the research team at UNT and the City of Denton discouraged any type of financial incentive. Every means available was used to encourage responses, including a cover letter signed by the three directors from three different centers at UNT and the City Manager sent out two letters to all employees for announcement and encouragement. Also, the focus group played a motivating role to increase the response rate of the survey. At the same time, a number of Web-based surveys have reported response rates below 20%, so the response rate encountered in this study was not considered unusual.

The questionnaire attempted to measure a number of dimensions, but it was relatively long and it could not probe deeply into the respondents' opinions and feelings. Also, the questionnaire was self-reported via respondents, so it involved the potential problems of honesty, social desirability, or motivation for thoughtful response, etc. Linear models of the research process are notoriously suspect (McGrath, Martin, &

Kukla, 1982) and may not reflect actual practice. No manifest measurement or any other latent construct is one hundred percent perfect: there is always measurement error to consider (Kelloway, 1998). Moreover, random, unexplained errors, always exists in survey design and administration.

The instruments used in this study are new and despite following all recommended instrument development procedures, there remains some uncertainty about each of the instrument's validity. This concern coupled with the single organization and small sample size imply that all the instrument development efforts in this research be viewed as preliminary. In addition, this work fails to account for the impact of such potential moderating variables as culture, gender, etc. Specific instrumentation issues in this work include that the IT governance and the organization-IS alignment constructs are new, and their theoretical foundation potentially requires further development. Another instrumentation issue involves combining IS-SERVQUAL and IS-SUCCESS together in one factor analysis by using the 0.5 and 0.3 rule. This combination of the two instruments is one approach to addressing the theoretical issues raised in this work. Other approaches such as examining the relationship between the instruments also merit consideration.

Recommendations for Future Research

Future research into readiness for e-government should investigate ways to study relationships among the four instruments of ISA, ITG, IS-ALIGN and EGOV, or study relationships among subsets of these instruments. Further theory development and the associated instrument refinement, and model validation are also necessary. Based on the results of this study, there exist two modified e-government readiness models (I & II), which represent good model fits. In the modified model (I), ISA may be better

represented by three dimensions reflecting technical quality, commitment to user involvement, and interaction between the staff and customers. EGOV may be better assessed by the strategic or planning stage. ITG and IS-ALIGN may be better represented by one dimension only. The result of the path analysis suggests that ITG is more important than IS-ALIGN and ISA in affecting EGOV. The order of the importance in affecting EGOV is ITG, IS-ALIGN and ISA in the modified model (I). The result of LISREL estimates suggests that the best structural equation is EGOV = 1.33*ITG + 0.84*IS-ALIGN.

In hypothesis 1 in the partial model, the relationship between ISA and ITG did not converge, so the modified model (II) only investigate relationships among the three instruments ISA, IS-ALIGN and EGOV. In the modified model (II), ISA may be better represented by technical quality, and attitude or commitment to user involvement. EGOV may be better assessed only by the planning stage. ITG should be omitted in order to improve the model fit. IS-ALGIN may be better represented by one dimension. The result of the path analysis suggests that IS-ALIGN is more important than ISA in affecting EGOV. The result of LISREL estimates suggests that the best structural equation is EGOV = 1.87*IS-ALIGN. In addition, ISA impacts EGOV directly, but negatively, in the model (II). This feature is different from other models, so it may need further research in the future. A proposed two models of e-government readiness, incorporating the results of this study, is shown in Figure 25 and 26.

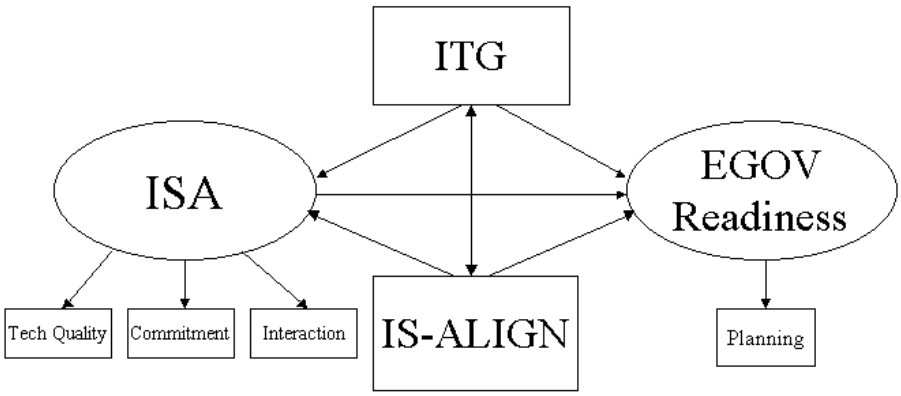


Figure 25. Proposed model (I) of e-government readiness.

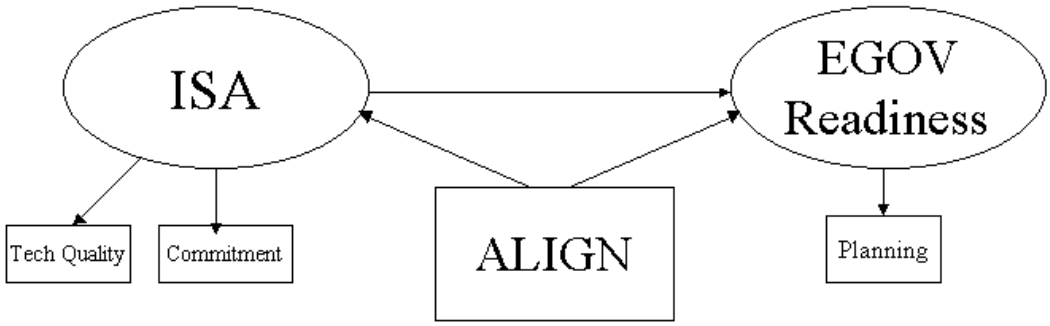


Figure 26. Proposed model (II) of e-government readiness.

The ISA instrument as used in this work was the result of combing two instruments, IS-SERVQUAL and IS-SUCCESS. Though a 0.5 and 0.5 loading rule was justified for the preliminary instrumentation development work undertaken in this work, future work should carefully examine options such as using a 0.5 and 0.4 rule or even a 0.5 and 0.3 rule. Combining IS-SERVQUAL and IS-SUCCESS into one instrument is one approach that was pursued based on the theory as presented in this study. However, separating the two instruments, IS-SERVQUAL and IS-SUCCESS, and examining their relationship is another potentially justifiable approach. In addition, forcing three factors

in the factor analysis for the ISA instrument may result in different dimensions that may fit theoretical models other than the one proposed by Myers et al. (1997). Using such different approaches with new data sets is of merit for future research.

Implications and Concluding Summary

Evidence was found in the study that various instruments developed to measure ISA, ITG, IS-ALIGN and EGOV should be combined to more effectively measure readiness for e-government. Results of this study indicate that although a number of factors contribute to IS assessment (such as dependability, technical quality, commitment, and interaction), attitude is one of the most important factors based on the results of the two modified models. The commitment of the staff to support user involvement and participation in IS development is crucial to readiness of e-government. To assess e-government readiness, the most important stage is the strategic or planning level. An organization prepares for e-government by devising enterprise-wide e-government strategies in line with business strategies and plans, which indicate it is a critical period. At this stage, the organization should be aware of the strategic importance of e-government and regard e-government initiatives as integral parts of overall business plans.

Contribution to Literature

Although the two modified models widely accepted the theoretical hypotheses, the confirmation of the relationships among constructs still needs researchers to pursue more reliable models either by replication of this research or by establishing a new theoretical model. However, the significant validity and reliability measures discussed in

this study indicate that the instrument of this e-government readiness model has the potential for use in further adoption studies.

Appendices

APPENDIX A

THE CITY OF DENTON SURVEY COVER LETTER

Welcome to The City of Denton Information Technology Survey

University of North Texas
College of Business Administration
Information Systems Research Center

Thank you for agreeing to participate in this survey. As part of the City of Denton's efforts to improve its performance, they are working with a research team from the University of North Texas (UNT) to conduct a study about how information technology (IT) relates to organizational performance. Your candid answers are important to help improve your work environment.

This on-line survey is being conducted by the UNT's Information Systems Research Center (ISRC), Center for Quality and Productivity (CQP), and Center for the Study of Work Teams (CSWT). The survey runs on the university's computers and the UNT research team will analyze the data and share only summaries to help the City of Denton enhance its ability to utilize IT, improve operational performance, and get ready for digital government. Only the UNT research team will see any individual survey responses, and we will keep your identify and individual responses absolutely confidential and anonymous.

The survey asks your opinions about the ITs that you use in your employment, as well as about other organizational and demographic characteristics. There are no right or wrong responses. There are three main parts to the survey. Please dedicate approximately three 1-hour sessions of your work time or, if you prefer, your time on-line at home, to complete this survey. If you don't have access to a computer at work please get with your supervisor to make arrangements. To access the survey, you have to use the personal code that was provided to you via email. The purpose of this code is to ensure the security and integrity of the survey, and to allow you to complete the survey in more than one online session. Only the UNT researchers have access to this code and it will not be disclosed to anyone. If you have not received the code or have any questions, please call Dr. Leon A. Kappelman at (940) 565-4968 or email to kapp@unt.edu.

Your participation in this study is voluntary, not required, and your refusal to participate will not adversely affect you in any way (other than your opinion will not be counted). In addition, you may withdraw from this study at any time; although, once you participate your contribution cannot be taken back. Participation in this study does not require you to reveal any personal information, aside from some demographics about things like your education and the ITs that you use at work. Do not put your name or address on any portion of the survey.

Your efforts and those of your colleagues will be used to help the City of Denton become a better place to work. Thank you for your time and assistance.

Best wishes,

Dr. Leon A Kappelman, Director, ISRC
College of Business Administration
(940) 565-3128

Dr. Michael Beyerlein, Director, CSWT
College of Arts and Sciences
(940) 565-3096

Dr. Victor R. Prybutok, Director, CQP
College of Business Administration
(940) 565-3110

APPROVED BY THE UNT IRB
FROM 3/27/01 TO 3/26/02

This project has been approved by the University of North Texas Committee for the Protection of Human Subjects, (940) 565-3940. Please retain a copy of this letter for your records.

P.O. Box 310530 · Denton, Texas 76203-0530 (940) 565-3128 · Fax (940) 565-4317 · Metro (817) 267-3731 x3128 TDD (800) 735-2989

APPENDIX B

THE CITY OF DENTON SURVEY INSTRUMENT

The City Of Denton Survey Instrument

This survey is comprised of three parts and each part consists of three pages. You must take them in order. Each time you complete a page, we will take you to the next page. Once you have completed a page, you will not be able to return to that page. You won't be able to return to those pages that you have already completed. You may take as many parts or pages as you wish in one session. You may stop at any time and continue later. We will keep track of your progress and bring you to the first page that you have yet to complete. Please remember your access code. You must use it each time you start a new session.

Please take a moment to familiarize yourself with the following terms and definitions used in the survey.

Terms and Definitions

The following terms and definitions are used throughout the questionnaire. You will be able to reference this page from each part of the survey. You may print a reference copy.

City of Denton (COD):

The entirety of governing bodies, operating units, and all of the departments and employees that provide products and services to the customers and citizens of the city of Denton, Texas.

Customer/citizens:

Those persons who live and/or work in the city of Denton and/or receive products and/or services from the COD.

Goals and objectives:

The intended results or outcomes to be achieved. Goals and objectives answer the question, "Where do we want to go?" Goals and objectives are set for short-, mid-, and long-term time horizons.

Information Technology (IT):

Computers, software, and the networks that connect them, but not the phone system or reprographics.

Internet:

The global public access collection of interconnected networks for communicating digital information. The World Wide Web (WWW) is a hypertext publishing facility of the Internet.

Management:

That group of people in the COD who provide leadership and make decisions about goals, objectives, plans, and strategies; specifically, the City Manager, Assistant City Managers, Directors and other department heads.

Plans and strategies:

The actions to be taken in order to reach goals and objectives. Plans and strategies answer the question, "How are we going to achieve our goals and objectives?"

Supplier/partner:

An organization or person(s) that makes resources, products and/or services available to the COD.

Technology Services Department (TSD):

The functional unit of the COD that provides information technologies and other products and services to the COD.

Part A-1.

1. Please check the department in which you work:

✍ (1) Budget & Fiscal Operations (including Accounting, Warehouse, Purchasing, Tax, & Treasury)
✍ (2) Building, Planning, & Zoning (including Bldg. Inspection & Consumer Health)
✍ (3) Community Development
✍ (4) Customer Service
✍ (5) Engineering
✍ (6) Electricity
✍ (7) Facility Management
✍ (8) General Govt. (including CMO, PIO, & Internal Audit)
✍ (9) Human Resources
✍ (10) Legal
✍ (11) Library
✍ (12) Motor Pool and Maintenance (including Vehicles & Parts)
✍ (13) Municipal Court
✍ (14) Parks

✍ (15) Public Safety (including Police, Fire, Animal Control, & Code Enforcement)
✍ (16) Safety, Training, and Risk Management
✍ (17) Solid Waste, Landfill, & Recycling
✍ (18) Technology Services
✍ (19) Transportation (including Traffic Control, Street, Public Transportation, & Airport)
✍ (20) Utilities Administration
✍ (21) Water, Wastewater, & Drainage
✍ (22) Others _____

2. For each of the following software applications:

Please check column A if you use the software at work.
Please check column B if you would like to have more training for the software.

Software applications	A. Software used	B. More training
Adobe Illustrator	✍	✍
Aldus Page Maker	✍	✍
Amazon Billing	✍	✍
ArcExplorer (ESRI)	✍	✍
ArcInfo	✍	✍
Brio	✍	✍
C/S Fleet Maintenance System	✍	✍
CityWorks	✍	✍
Civicall	✍	✍
Class	✍	✍
Court Specialists Inc System	✍	✍
CRW Trak-it	✍	✍
Dynix Library System	✍	✍
Excel	✍	✍
Geographic Information System	✍	✍
Groupwise	✍	✍
Harris Billing System	✍	✍
ICS/VisionAir	✍	✍
JDEdwards Human Resources	✍	✍
LaserFiche	✍	✍
MetaCube Data Warehousing	✍	✍
Microsoft Project	✍	✍
Microsoft Publisher	✍	✍
Microsoft Request	✍	✍
Powerpoint	✍	✍
SpindleMedia	✍	✍
Tax Accounting System	✍	✍
Teleworks	✍	✍
Trashflow	✍	✍
Veritas Backup Express	✍	✍
Web Casting	✍	✍
Word	✍	✍

WordPerfect	✍	✍
Other	_____	_____

3. Please check all the training that you have completed.

A+ Certification	✍
A+ Complete	✍
Access - Part 1	✍
Access - Part 2	✍
Excel - Expert User	✍
Excel - Proficient User	✍
GroupWise	✍
PowerPoint	✍
PowerPoint 2000 Cheat Sheet	✍
PowerPoint 2000 Exam Prep	✍
TimeQuest	✍
How Computers Work	✍
Windows 98	✍
Windows 98 Upgrade Training	✍
Word - Expert User	✍
Word - Proficient User	✍
Other	_____

4. How many hours per week do you work for the COD?
_____ hours

5. How many hours per week do you use IT to perform your COD work?
_____ hours

6. How long have you worked for the COD?
_____ years _____ months

7. How long have you been in your current job?
_____ years _____ months

8. How many years of experience do you have using Information Technology?
_____ years _____ months

9. Please check the type of your job.

✍ (1) Field Service
✍ (2) Mid-level managers
✍ (3) Office/Clerical
✍ (4) Professionals

✍ (5) Supervisors
✍ (6) Technical paraprofessionals
✍ (7) Others _____

10. What is the highest formal schooling you have completed?

✍ (1) High School
✍ (2) Some college
✍ (3) 2-year college
✍ (4) 4-year college
✍ (5) Graduate school
✍ (6) Others

11. What is your age? _____ years

12. What is your gender? ✍ (1) Female ✍ (2) Male

Part A-2								
Please read each question carefully and check the response that best expresses your view. If you do not know the answer you should check N/A. 1 = Strongly Disagree 2 = Disagree 3 = Weakly Disagree 4 = Neutral 5 = Weakly Agree 6 = Agree 7 = Strongly Agree NA = Not Applicable or Don't Know								
	Strongly Disagree [1]	[2]	[3]	Neutral [4]	[5]	Strongly Agree [6]	[7]	Not Applicable NA
1. The COD has strong values for achieving high quality performance that apply consistently throughout all facets of the organization.	✍1	✍2	✍3	✍4	✍5	✍6	✍7	✍ NA
2. The COD has good communication channels through which management's direction (values and expectations) clearly delivered to employees.	✍1	✍2	✍3	✍4	✍5	✍6	✍7	✍ NA
3. Management of the COD clearly sets strategy, goals, and objectives for future directions for the organization.	✍1	✍2	✍3	✍4	✍5	✍6	✍7	✍ NA
4. Management of the COD establishes and reinforces environment for empowerment and innovation.	✍1	✍2	✍3	✍4	✍5	✍6	✍7	✍ NA
5. Management of the COD encourages and supports organizational and employee learning.	✍1	✍2	✍3	✍4	✍5	✍6	✍7	✍ NA
6. The COD evaluates performance and capabilities of all functions of the organization on a regular basis.	✍1	✍2	✍3	✍4	✍5	✍6	✍7	✍ NA

7. The COD uses recent performance review findings as feedback for improvement and innovation opportunities.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
8. Management of the COD is concerned with the impact on society of our products, services, or operations.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
9. The COD actively supports and strengthens our relationships with key segment of the community (such as education, community service organizations, religious organizations, or professional associations).	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
10. The COD has a well-defined short-term (1-2 years) plan to help achieve its goals and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
11. The COD has a well-defined long-term (2-5 years) plan to help achieve its goals and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
12. The COD has a well-defined strategy/plan to increase customer/citizen satisfaction.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
13. The COD has well-defined human resource requirements and plans which consider employees' capabilities and needs.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
14. The COD has a well-defined strategy/plan to enhance supplier/partner relationships.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
15. The COD has well-defined strategy/plan to address key goals and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
16. The COD employs performance measures or indicators for tracking progress relative to its action plans.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
17. The COD allocates resources well to ensure accomplishment of overall action plans.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
18. The COD has a formal method for determining current product/service requirements and expectations of its customers/citizens.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
19. The COD has a formal method for determining future product/service requirements and expectations of its customers/citizens.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
20. The COD has a formal method for identifying customer/citizen groups and market segments.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
21. The COD has effective customer relationship practices that enable customers/citizens to seek assistance, comments, or complaints.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
22. The COD continuously improves its customer/citizen relationship management practices.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
23. The COD determines key customer/citizen contact requirements and delivers them to all employees involved in the response chain.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
24. The COD resolves customer/citizen complaints	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

promptly and effectively.	
25. The COD formally examines customer/citizen complaints in order to make necessary improvements to its processes.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
26. The COD measures and analyzes current levels of customer/citizen satisfaction and dissatisfaction.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
27. The COD compares its customer/citizen satisfaction results with those of similar organizations.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
The COD provides effective performance measurement systems and techniques for ensuring each of the following (28-32):	
28. data and information reliability.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
29. data and information consistency.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
30. data and information accessibility.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
31. data and information review.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
32. timely update of data and information.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
33. The COD regularly performs comparisons of its performance to similar world-class organization benchmarks in order to support its performance, evaluation, and improvement.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
34. Performance data and information gathered internally is systematically analyzed to help support overall quality objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
35. Performance data and information gathered externally is systematically analyzed to help support overall quality objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
36. The COD has human resource plans derived from the strategic plan that is aimed at achieving the full potential of its work force.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
Part A-3	
The COD exerts efforts toward building a work environment and an employee support climate conducive to the following (37-40):	
37. performance excellence.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
38. full involvement in their work.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
39. personal growth.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
40. organizational growth.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
41. The COD promotes cooperation, individual initiatives, innovation, and flexibility to achieve its goals and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
42. The COD's compensation, recognition, and related reward practices reinforce high performance.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
43. The COD has a formal program for education and training that keeps up with business and individual needs.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
44. All employees in the COD receive training (e.g.,	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

diversity training, management development, new employee orientation, and safety, and information technology, etc.) required for them to meet the objectives associated with their responsibilities.	
45. The COD maintains a work environment conducive to the well-being and growth of all its employees.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
46. The COD regularly monitors employee satisfaction and uses the results to support its quality improvement and innovation efforts.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
The COD has a systematic method for introducing new products and services which include the following (47-49):	
47. designing in customer/citizen requirements.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
48. addressing quality issues early in the design cycle.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
49. analyzing relevant process capabilities.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
50. The COD monitors the processes used to provide products and services in order to identify when it is necessary to make corrections.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
51. The COD continuously improves the processes used to provide its products and services.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
The COD formally assesses the quality of its (52-54):	
52. products and services.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
53. production and delivery systems.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
54. goods and services supplied by external suppliers and partners.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
55. The COD's quality requirements are communicated to all external suppliers of goods and services.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
The COD's current level of each of the following is superior to similar cities (56-69)	
56. customer/citizen satisfaction.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
57. customer/citizen loyalty and positive referral.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
58. customer/citizen-perceived value.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
59. financial performance (e.g. return on investment, budget variance, profitability).	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
60. employee well-being and development.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
61. employee satisfaction.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
62. supplier and partner performance (e.g. performance/cost improvement, quality).	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
63. regulatory/legal compliance.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
64. quality.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
65. productivity.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
66. environmental citizenship.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
67. fostering economic development.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
68. crime control.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
69. education.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

70. I like using computers and Information Technology.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
71. The COD uses IT to achieve high quality performance that applies consistently throughout all facets of the organization.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

Part B-1

Please rate the extent to which the performance of the Technology Service Department's staff meets your expectations in each of the following areas. Please read each question carefully and click on the appropriate response.

1 = far short of expectations
2 = short of expectations
3 = slightly short of expectations
4 = meets expectations
5 = slightly exceeds expectations.
6 = exceeds expectations.
7 = greatly exceeds expectations
NA = Not Applicable or Don't Know

	far short of expectations [1] [2] [3] [4] [5] [6] [7] greatly exceeds expectations Not Applicable NA
1. The TSD staff does what it promises to do.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
2. The TSD staff is reliable.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
3. The TSD staff performs services right the first time.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
4. The TSD staff is dependable.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
5. **Reliability** means the extent to which the TSD staff performs promised service dependably. Please rate the overall reliability of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
6. The members of the TSD staff have the technical skills needed to do their jobs well.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
7. The members of the TSD staff are appropriately qualified for their jobs.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
8. The TSD staff has the expertise required to create or evaluate for purchase the information technologies needed by the City.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
9. The TSD staff has the expertise required to maintain the computer-based information systems needed by the City.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
10. The members of the TSD staff have an amount of experience appropriate for their positions.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
11. **Competence** means the technical skills and expertise of the TSD staff. Please rate the overall competence of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
12. When I have a problem, the TSD staff does its best to respond as soon as possible.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
13. The people on the TSD staff return my calls	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

promptly.	
14. Members of the TSD staff respond quickly to e-mails requesting information or assistance.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
15. Members of the TSD staff are always willing to help.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
16. The TSD department responds quickly to my requests for help with software applications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
17. **Responsiveness** means the willingness and speed with which the TSD staff makes an initial response to inquires from users. Please rate the overall responsiveness of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
18. When problems occur, the TSD staff solves them in a timely manner.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
19. The TSD staff finishes projects on time.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
20. The members of the TSD staff meet their deadlines during system development and implementation.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
21. Change requests are completed in a timely manner.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
22. **Timeliness** means the elapsed time between a user's request and the design, development and implementation of new applications or change requests by the TSD staff. Please rate the timeliness of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
23. The members of the TSD staff are able to explain new systems/software in a manner that I can understand.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
24. The TSD staff keeps me informed in advance of scheduled system downtime.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
25. The TSD staff keeps me informed of the status of ongoing projects that will affect my job.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
26. It is easy for me to communicate with the TSD department.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
27. The TSD staff demonstrates good interpersonal communication skills in their interactions with other people.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
28. **Communications** means the exchange of pertinent information between the TSD staff and the users. Please rate the overall communication ability of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
Part B-2	
29. The TSD staff ensures that users are properly trained on new systems.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
30. The TSD staff provides adequate training support for my needs.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
31. The training provided by the TSD staff is helpful.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
32. The TSD staff understands that a new project is not over until the user training is complete.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

33. **Training** means the amount of instruction and support for learning that is afforded to the user to increase the user's proficiency in utilizing Information Technologies. Please rate the training provided by the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
34. The TSD staff understands the specific needs of the users.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
35. My IT-related problems are important to the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
36. The members of the TSD staff understand my frustrations with COD ITs.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
37. The members of the TSD staff have my best interest at heart.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
38. The members of the TSD staff show a sincere interest in helping me with my problems.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
39. **Empathy** means the ability of the TSD staff to understand the specific needs of the user. Please rate the overall empathy of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
40. People on the TSD staff are open to suggestions from users regarding how Information Technology systems can be improved.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
41. The members of the TSD staff are committed to user involvement in the design, development or alteration of COD ITs.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
42. The members of the TSD staff seek input from users before making changes to existing systems.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
43. The TSD staff considers users to be part of the development team.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
44. **Attitude/Commitment** to user involvement means the commitment of the TSD staff to support user involvement and participation in the design, development, or alteration of computer-based information systems. Please rate the Attitude/Commitment to user involvement of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
45. The members of the TSD staff have a good working relationship with people in other departments.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
46. I have a good working relationship with the members of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
47. The members of the TSD staff are courteous.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
48. I get along well with members of the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
49. **Relationships** mean the manner and methods of interaction, conduct, and personal association between users and the TSD staff. Please rate the relationships between you and the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

50. The COD's computer/network is available when I need to use it.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
51. I can gain access to COD system resources when needed for work.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
52. COD Help Desk and system support have operating hours convenient to the users.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
53. The software that I need to do my job is available during working hours.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
54. **Access** means the availability or ease with which the appropriate hardware, software, and people can be utilized to support the performance of your work. Please rate the access provided by the TSD staff.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
Part B-3	
Please rate the extent to which the performance of the Technology Service Department's staff meets your expectations in each of the following areas. Please read each question carefully and click on the appropriate response. 1 = far short of expectations 2 = short of expectations 3 = slightly short of expectations 4 = meets expectations 5 = slightly exceeds expectations. 6 = exceeds expectations. 7 = greatly exceeds expectations NA = Not Applicable or Don't Know	
	far short of expectations [1] [2] [3] [4] [5] [6] [7] greatly exceeds expectations Not Applicable NA
Regarding Information Technologies you use as a COD employee, please rate the following (1-7):	
1. reliability.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
2. ease of use.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
3. accessibility.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
4. usefulness.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
5. flexibility.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
6. Please rate the OVERALL quality of Information Technologies in the COD.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
Regarding the data and information provided by the COD's Information Technologies, please rate the following (7-13)	
7. content.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
8. availability.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
9. accuracy.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
10. timeliness.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
11. conciseness.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
12. convenience.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
13. Please rate the overall quality of data and	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

information provided by the COD's Information Technologies.	
Please read each question carefully and check the response that best expresses your view. If you do not know the answer you should check N/A. 1 = Strongly Disagree 2 = Disagree 3 = Weakly Disagree 4 = Neutral 5 = Weakly Agree 6 = Agree 7 = Strongly Agree NA = Not Applicable or Don't Know	
	Strongly Disagree [1] [2] [3] Neutral [4] [5] [6] Strongly Agree [7] Not Applicable NA
14. **Overall,** I am satisfied with the COD's Information Technologies.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
15. **Overall**, there has been a positive impact as to how much my performance was improved by the aid of COD's Information Technologies.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
16. **Overall**, there has been a positive impact as to how much the COD's performance was improved by the aid of Information Technologies.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
17. The COD has a well defined plan for Information Technology (IT).	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
The COD's IT plan was developed taking the following into consideration (18-21):	
18. organization's strategies and plans.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
19. IT support for the COD goals and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
20. IT market.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
21. assessment of current COD systems in terms of IT resources (people, applications, technology, facilities, and data).	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
22. The COD uses a predefined set of standards and guidelines to evaluate all requests for IT purchases and modifications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
23. IT investments and operating budgets are established and approved with consideration of alignment with the COD's strategies and plans.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
24. The COD establishes and communicates IT policies and procedures to all employees.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
25. The COD establishes and maintains IT standards and guidelines that take organizational goals and objectives into consideration.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
26. In the COD, IT standards and guidelines are	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

established and translated into practical and usable rules for employees.	
27. Management in the COD is not concerned with the impact on society of our products, services, or operations.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

Part C-1

The following is a list of government functions that can be facilitated by using Internet technologies. How important are they for the City of Denton's e-government or digital government initiatives? For each function, please specify your opinion on a scale from 1 (Absolutely un-important) to 7 (Absolutely important).

1 = Absolutely un-important
2 = Very un-important
3 = Not important
4 = Neutral
5 = Important
6 = Very important
7 = Absolutely important
NA = Not Applicable or Don't Know

	Absolutely Unimportant [1] [2] [3]	Neutral [4]	Absolutely important [5] [6] [7]	Not Applicable NA
A. On-line Publishing				
1. City information	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
2. City budget	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
3. Minutes of meetings	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
4. GIS data	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
5. On-line tour of city	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
6. Employee manuals	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
7. Other publishing functions not listed above (please specify): _____				
B. Broadcasting				
8. Video broadcast of meetings	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
9. Audio broadcast of meetings	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
10. Live traffic cams	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
11. Other broadcasting functions not listed above (please specify): _____				
C. Online Procurement				
12. Bidder applications	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
13. Calls for bids or proposals	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
14. Other procurement functions not listed above (please specify): _____				
D. Online Payments	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
15. Tax collection	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
16. Utility payments	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
17. Collection of fees	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA
18. Collection of fines	✍1 ✍2 ✍3	✍4	✍5 ✍6 ✍7	✍ NA

19. Payments to service providers	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
20. Other payment functions not listed above (please specify): _____	
E. Online Customer Service	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
21. Voter registration	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
22. Property registration	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
23. Permit application and renewal	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
24. License application and renewal	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
25. Requests for service	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
26. Requests for records	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
27. Surveys & polls	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
28. Forums & discussions	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
29. Other service functions not listed above (please specify): _____	
F. Operational Support for COD Employees	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
30. E-mail access	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
31. Online calendar	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
32. Scheduling meetings on-line	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
33. Video conferencing	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
34. On-line document management	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
35. Other support functions not listed above (please specify): _____	
G. Miscellaneous	
36. On-line job applications	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
37. Emergency management	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
38. Other functions not listed above (please specify): _____	

Part C-2

Please respond to each of the following statements concerning the use of the Internet at the City of Denton using a scale from 1 (strongly disagree) to 7(strongly agree).

1 = Strongly Disagree
2 = Disagree
3 = Weakly Disagree
4 = Neutral
5 = Weakly Agree
6 = Agree
7 = Strongly Agree
NA = Not Applicable or Don't Know

	Strongly Disagree [1] [2]	[3] Neutral [4]	[5] [6] Strongly Agree [7]	NA Not Applicable
39. The COD has strategic plans that govern all Internet activities.	✍1 ✍2	✍3 ✍4 ✍5 ✍6	✍7	✍ NA
40. The COD has clearly stated objectives of using the Internet.	✍1 ✍2	✍3 ✍4 ✍5 ✍6	✍7	✍ NA
41. The Internet is an integral part of the COD business plans.	✍1 ✍2	✍3 ✍4 ✍5 ✍6	✍7	✍ NA
42. The COD's Internet strategies are deliberately	✍1 ✍2	✍3 ✍4 ✍5 ✍6	✍7	✍ NA

aligned with its strategic plans.	
43. The COD carefully coordinates development of all Internet applications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
44. The COD pays close attention to ensuring compatibility among Internet applications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
45. The COD has a centralized function that oversees the development of all Internet applications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
46. The COD's Internet applications are designed and developed to work with legacy systems.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
47. All of the COD's Internet applications can share data with other COD Internet applications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
48. All COD's Internet applications can share data with COD non-Internet applications.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
49. All COD's Internet applications share standardized data.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
50. Overall, I am very dissatisfied with the COD's Information Technologies.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
51. I like using computers and Information Technology.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
The following is a list of potential barriers to e-government initiatives. How critical is each barrier to the City of Denton? Respond to each item using a scale from 1 (Absolutely not critical) to 7 (Absolutely critical). 1 = Absolutely not critical 2 = Highly un-critical 3 = Not critical 4 = Neutral 5 = Critical 6 = Highly critical 7 = Absolutely critical NA = Not Applicable or Don't Know	
	Strongly Disagree [1] [2] [3] Neutral [4] [5] [6] [7] Strongly Agree Not Applicable NA
52. Lack of Internet technology	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
53. Lack of Internet support staff	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
54. Lack of information about e-government applications	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
55. Lack of support from elected officials	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
56. Lack of support from COD management	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
57. Need to upgrade technology	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
58. Privacy issues	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
59. Security issues	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
60. Lack of financial resources	
61. Issues relating to convenience fees for transactions	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

62. Time constraints	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
63. Other barrier not listed above (please specify)	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

Part C-3

Please read each question carefully and check the response that best expresses your view. If you do not know the answer you should check N/A.

1 = Strongly Disagree
2 = Disagree
3 = Weakly Disagree
4 = Neutral
5 = Weakly Agree
6 = Agree
7 = Strongly Agree
NA = Not Applicable or Don't Know

	Strongly Disagree [1] [2]	[3]	Neutral [4]	[5]	Strongly Agree [6] [7]	Not Applicable NA
The City of Denton uses IT...	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
1. ... to achieve high quality performance that applies consistently throughout all facets of the organization.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
2. ... to communicate values and expectations.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
3. ... to set goals and objectives.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
4. ... to set plans and strategies to achieve goals and objectives.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
5. ... to reinforce an environment for empowerment and innovation.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
6. ... to support organizational and employee learning.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
7. ... to evaluate performance and capabilities of all functions of the organization.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
8. ... for performance review and feedback for improvement and innovation opportunities.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
9. ... to support and strengthen relationships with key segments of the community (such as education, community service organizations, religious organizations, or professional associations).	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
10. ... to increase customer/citizen satisfaction.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
11. ... to define human resources requirements.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
12. ... to enhance supplier/partner relationships.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
13. ... to allocate resources to ensure accomplishment of overall action plans.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
14. ... to determine current product/service requirement and expectation of its customers and citizens.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
15. ... to identify customer/citizen groups and market segments.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA
16. ... to make necessary improvements to its processes.	✍1 ✍2	✍3	✍4	✍5	✍6 ✍7	✍ NA

17. ... to make regular comparisons of its performance to similar world-class organizations to support its overall performance, evaluation, and improvement efforts.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
18. ... to gather internal performance data and information to help support overall plans, strategies, goals, and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
19. ... to gather external performance data and information to help support overall plans, strategies, goals, and objectives.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA
20. ... to promote cooperation, individual initiatives, innovation, and flexibility.	✍1 ✍2 ✍3 ✍4 ✍5 ✍6 ✍7 ✍ NA

?? Please click (Reset) if you would like to reset (or clear) all your responses to this page and start again.
?? Please click (Submit) if you are satisfied with your responses AND you have completed ALL APPLICABLE AREAS of this page of the questionnaire.

Thank You!!

APPENDIX C

DEMOGRAPHIC ANALYSIS FROM 171 USABLE SURVEYS

Table 46

Distribution of Respondents by Gender From 171 Usable Surveys

	Frequency	Percent
1. Female	95	55.56%
2. Male	71	41.52%
Valid data	166	97.08%
Missing data	5	2.92%
Total	171	100.00%

Table 47

Distribution of Respondents by Age From 171 Usable Surveys

Age range	Frequency	Percent
15 and Under 25 years old	6	3.51%
25 and Under 35 years old	44	25.73%
35 and Under 45 years old	49	28.65%
45 and Under 55 years old	54	31.58%
55 and Under 65 years old	11	6.43%
Valid data	164	95.91%
Missing data	7	4.09%
Total	171	100.0%

Table 48

Distribution of Respondents by Education From 171 Usable Surveys

	Frequency	Percent
1. High School	20	11.7%
2. Some college	40	23.4%
3. Two-year college	17	9.9%
4. Four-year college	51	29.8%
5. Graduate school	28	16.4%
Valid data	156	91.2%
Missing data	15	8.8%
Total	171	100.0%

Table 49

Distribution of Years Range of Respondents Worked for the COD From 171 Usable Surveys

Years Range	Frequency	Percent
Less than 1 year	16	9.36%
1 and Under 2 years	11	6.43%
2 and Under 4 years	17	9.94%
4 and Under 6 years	26	15.20%
6 and Under 10 years	22	12.87%
10 and Under 15 years	22	12.87%
15 and Under 20 years	22	12.87%
20 and More than 20 years	14	7.60%
Valid data	149	87.14%
Missing system	22	12.86%
Total	171	100.00%

Table 50

Distribution of Years Range of Respondents Having Been Their Current Job From 171 Usable Surveys

Years range	Frequency	Percent
Less than 1 years	31	18.13%
1 and Under 2 years	15	8.77%
2 and Under 4 years	30	17.54%
4 and Under 6 years	19	11.11%
6 and Under 10 years	11	6.43%
10 and Under 15 years	18	10.53%
15 and Under 20 years	6	3.51%
20 and More than 20 years	2	1.17%
Valid data	132	77.19%
Missing system	39	22.81%
Total	171	100.00%

Table 51

Distribution of Years of Experience of Respondents Using IT From 171 Usable Surveys

Years range	Frequency	Percent
Less than 1 years	6	3.51%
1 and Under 2 years	8	4.68%
2 and Under 4 years	13	7.60%
4 and Under 6 years	27	15.79%
6 and Under 10 years	32	18.71%
10 and Under 15 years	38	22.22%
15 and Under 20 years	34	19.88%
20 and More than 20 years	9	5.26%
Valid data	167	97.66%
Missing data	4	2.34%

Total	171	100.00%

Table 52

Distribution of Respondents by Working Departments From 171 Usable Surveys

Department	Frequency	Percent	N of employees	Participation rate
(1) Budget & Fiscal Operations	17	9.94%	45	57.8%
(2) Building, Planning, & Zoning	6	3.51%	26	53.8%
(3) Community Development	7	4.09%	14	78.6%
(4) Customer Service	3	1.75%	32	31.3%
(5) Engineering	9	5.26%	135	11.1%
(6) Electricity	10	5.85%	33	66.7%
(7) Facility Management	5	2.92%	11	81.8%
(8) General Govt.	3	1.75%	15	46.7%
(9) Human Resources	4	2.34%	15	80.0%
(10) Legal	4	2.34%	10	80.0%
(11) Library	3	1.75%	40	52.2%
(12) Motor Pool and Maintenance	1	0.58%	16	12.5%
(13) Municipal Court	3	1.75%	15	33.3%
(14) Parks	12	7.02%	72	29.2%
(15) Public Safety	28	16.37%	333	19.5%
(16) Safety, Training, and Risk Management	0.00	0.00%	8	12.5%
(17) Solid Waste, Landfill, & Recycling	4	2.34%	78	10.3%
(18) Technology Services	15	8.77%	28	78.6%
(19) Transportation	8	4.68%	33	39.4%
(20) Utilities Administration	6	3.51%	7	100.0%
(21) Water, Wastewater, & Drainage	17	9.94%	128	23.4%
(22) Others _____	6	3.51%	10	-
Total	171	100.00%	1104	30.7%

Table 53

Distribution of Respondents by Software Used and More Training From 171 Usable Surveys

Software applications	Software used		More training	
	Frequency	Percent	Frequency	Percent
1. Adobe Illustrator	32	18.7%	41	24.0%
2. Aldus Page Maker	3	1.8%	25	14.6%
3. Amazon Billing	3	1.8%	12	7.0%
4. ArcExplorer (ESRI)	29	17.0%	41	24.0%
5. ArcInfo	14	8.2%	32	18.7%
6. Brio	23	13.5%	39	22.8%
7. C/S Fleet Maintenance System	4	2.3%	26	15.2%
8. CityWorks	5	2.9%	22	12.9%

9. Civicall	35	20.5%	38	22.2%
10. Class	5	2.9%	13	7.6%
11. Court Specialists Inc System	4	2.3%	15	8.8%
12. CRW Trak-it	11	6.4%	21	12.3%
13. Dynix Library System	5	2.9%	10	5.8%
14. Excel	140	81.9%	59	34.5%
15. Geographic Information System	23	13.5%	40	23.4%
16. Groupwise	155	90.6%	43	25.1%
17. Harris Billing System	19	11.1%	21	12.3%
18. ICS/VisionAir	9	5.3%	19	11.1%
19. JDEdwards Human Resources	20	11.7%	24	14.0%
20. LaserFiche	5	2.9%	16	9.4%
21. MetaCube Data Warehousing	0	0.0%	13	7.6%
22. Microsoft Project	27	15.8%	35	20.5%
23. Microsoft Publisher	48	28.1%	30	17.5%
24. Microsoft Request	15	8.8%	17	9.9%
25. Powerpoint	100	58.5%	57	33.3%
26. SpindleMedia	1	1.6%	10	5.8%
27. Tax Accounting System	0	0.0%	12	7.0%
28. Teleworks	4	2.3%	14	8.2%
29. Trashflow	1	0.6%	13	7.6%
30. Veritas Backup Express	1	0.6%	11	6.4%
31. Web Casting	1	0.6%	16	9.4%
32. Word	140	81.9%	36	21.1%
33. WordPerfect	36	21.1%	14	8.2%

Table 54

Distribution of Respondents Completed All the Software Training From 171 Usable Surveys

	Frequency	Percent
1. A+ Certification	1	1.6%
2. A+ Complete	0	0.0%
3. Access - Part 1	43	25.1%
4. Access - Part 2	19	11.1%
5. Excel - Expert User	15	8.8%
6. Excel - Proficient User	45	26.3%
7. GroupWise	74	43.3%
8. PowerPoint	49	28.7%
9. PowerPoint 2000 Cheat Sheet	3	1.8%
10. PowerPoint 2000 Exam Prep	1	0.6%
11. TimeQuest	0	0.0%
12. How Computers Work	12	7.0%
13. Windows 98	41	24.0%
14. Windows 98 Upgrade Training	8	4.7%
15. Word - Expert User	16	9.4%
16. Word - Proficient User	48	8.1%

Table 55

Distribution of Hours Range of Respondents Working Hours Per Week From 171 Usable Surveys

Hours Range	Frequency	Percent
Under 30 hours	2	1.17%
30 and Under 40 hours	118	69.01%
40 and Under 45 hours	15	8.77%
45 and Under 55 hours	20	11.70%
55 and More than 55	16	9.36%
Total	171	100.00%

Table 56

Distribution of Hours Range of Respondents Used IT to Perform the COD Work From 171 Usable Surveys

Hours range	Frequency	Percent
0 and Under 10 hours	29	16.96%
10 and Under 20 hours	18	10.53%
20 and Under 30 hours	38	22.22%
30 and Under 40 hours	44	25.73%
40 and Under 50 hours	35	20.46%
50 and More than 50 hours	4	2.33%
Valid data	168	98.25%
Missing data	3	1.75%
Total	171	100.00%

Table 57

Distribution of Respondents by Job Type From 171 Usable Surveys

	Frequency	Percent
1. Field Service	7	4.09%
2. Mid-level managers	40	23.39%
3. Office/Clerical	25	14.62%
4. Professionals	37	21.64%
5. Supervisors	13	7.60%
6. Technical paraprofessionals	34	19.88%
7. Others	15	8.77%
Total	171	100.00%

REFERENCES

Akaike, H. (1987). Factor analysis and the AIC. Psychometrika, 52, 317-332.

Alreck, P.L., & Settle, R.B. (1985). The Survey Research Handbook. Homewood, IL: Irwin.

Augustyn, M., & Ho, S. K. (1998). Service quality and tourism. Journal of Travel Research, 37(1), 71-72.

Babakus, E., & Boller, G. W. (1992). An empirical assessment of the SERVQUAL scale. Journal of Business Research, 24, 253-268.

Bagozzi, R. P. (1981). Attitude, intentions, and behavior: A test for some key hypotheses. Journal of Personality and Social Psychology, 41, 607-627.

Ballantine, J., Bonner, M., Levy, M., Martin, A., Munro, I., & Powell, P. L. (1998). Developing a 3-D model of information systems success. In E. Garrity & L. Sanders (Eds.), Information System Success Measurement, Harrisburg, PA: Idea Group.

Baum, C., & Di Maio, A. (2000). Gartner's four phases of e-government model. E-government Strategies- State & Local. Retrieved May 5, 2001 from the World Wide Web: http://old.gartner.com/public/static/hotc/00094235.html

Bell, R., & Keys, B. (1998). A conversation with Curt W. Reimann on the background and future of the Baldrige Award. Organizational Dynamics, 26(4), 51-61.

Bemowski, K., (1995). 1994 Baldrige Award recipients share their expertise. Quality Progress, 28, 35-40

Bemowski, K., & Stratton, C. (1995). How do people use the Baldrige Award criteria. Quality Progress, 28, 43-47.

Bentler, P. M. (1990). Comparative fit indexes in structural models. Psychological Bulletin, 107, 238-246.

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin, 88, 588-606.

Blalock, H. M. (1964). Causal Inference in Non-experimental Research. Chapel Hill: University of North Carolina Press.

Bobrowski, P., & Bantham, J. (1994). State quality initiatives: Mini-Baldrige to Baldrige plus. National Productivity Review, 13(3), 423-438.

Bollen, K. A. (1989). Structural Equations with Latent Variables. New York, NY: John Wiley & Sons.

Bollen, K. A., & Long, J. S. (1993). Introduction. In K. A. Bollen & J. S. Long (Eds.), Testing Structural Equation Models. Beverly Hills, CA: Sage.

Bozdogan, H. (1987). Model selection and Akaike's Information Criterion (AIC). Psychometrika, 52, 345-370.

Boyle, B. (2000). Electronic government for New Zealand: Managing the transition. Master's thesis, Massachusetts Institute of Technology, Massachusetts. Retrieved September 5, 2001 from the World Wide Web: http://www.e-government.govt.nz/publications.html

Browne, M. W. & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. Multivariate Behavioral Research, 24, 445-455.

Buckley, J. W., Buckley, M. H., & Chiang, H. F. (1976). Research Methodology & Business Decisions. New York, NY: National Association of Accountants and the Society of Industrial.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. Psychological Bulletin, 56(2), 81-105.

Carman, J. M. (1990). Consumer perceptions of service quality: An assessment of the SERVQUAL dimensions. Journal of Retailing, 66(1), 33-55.

Carrubba, G. (1992) Using the Malcolm Baldrige framework for quality self-assessment. Electro/92 Conference Record (pp. 420-422). Boston, MA: Hynes Convention Center, 420-422.

Cliff, N. (1983). Some cautions concerning the application of causal modeling methods. Multivariate Behavioral Research, 18, 115-116.

Cronin Jr., J. J., & Taylor, S. A. (1992). Measuring service quality: A reexamination and extension. Journal of Marketing, 56(3). 55-68.

Cronin Jr., J. J., & Taylor, S. A. (1994). SERVPERF versus SERVQUAL: Reconciling performance-based and perceptions-minus-expectations measurement of service quality. Journal of Marketing, 58.

Dawes, S. S., Bloniarz, P. A. & Kelly, K. L. (1999). Some assembly required: Building a digital government for the 21st century. Report of a Multidisciplinary Workshop Held in October 1998. Retrieved May 5, 2001 from the World Wide Web: http://www.ctg.albany.edu/research/workshop/dgfinalreport.pdf

Decarlo, N. J., & Sterett, W. K. (1990). History of the Malcolm Baldrige National Quality Award. Quality Progress, 23, 30-32.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. Information Systems Research, 3(1), 60-95.

DeLone, W. H., & McLean, E. R. (2000). Information systems success: The quest for the dependent variable(s) revisited. American University Working Paper.

Dielman, T. E. (1996). Applied Regression Analysis for Business and Economics (2nd Edition). Belmont, CA: Wadsworth Publishing Company.

Dodd, J. (2000). Delivering on the e-government promise: A vision for our time. Government Technology. Retrieved May 5, 2001 from the World Wide Web: http://www.govtech.net/govcenter/solcenter/nic-may00/solution.phtml

Ein-Dor, P., & Segev, E. (1978). Organizational context and the success of management information systems. Management Science, 24(10), 1064-1077.

Emery, J. C. (1971). Cost/Benefit Analysis of Information Systems. Chicago, IL: SMIS Workshop Report Number 1, The Society for Management Information Systems.

Etezadi-Amoli, J., & Farhoomand, A. F. (1996). A structural model of end user computing satisfaction and user performance. Information & Management, 30, 65-73.

Gelderman, M. (1998). The relationship between user satisfaction, usage of information systems and performance. Information & Management, 34, 11-18.

Goodhue, D. L. & Thompson, R. L. (1995). Task-technology fit and individual performance. MIS Quarterly, 19(2), 213-233.

Guimaraes, T., & Igbaria, M. (1997). Client/server system success; Exploring the human side. Decision Sciences, 28(4), 851-875.

Hair, J., Anderson, R., Tathan, R., & Black, W. (1995). Multivariate Data Analysis. Englewood Cliffs, NJ: Prentice Hall..

Hamilton, S., & Chervany, N. L. (1981). Evaluating information system effectiveness- Part I: Comparing evaluation approaches. MIS Quarterly, 5(3), 55-69.

Hayduk, L. A. (1987). Structural Equation Modeling with LISREL: Essentials and Advances. Baltimore, MD: Johns Hopkins University Press.

Henderson, J. C., & Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organizations. IBM Systems Journal, 32(1), 4-16.

Herrington, M. (1994). Why not a do-it-yourself Baldrige Award? Across the Board, 31(9), 34-38.

Igbaria, M., & Tan, M. (1997). The consequences of the information technology acceptance on subsequent individual performance. Information & Management, 32,113-121.

Ives, B., Hamilton, S., & Davis, G. B. (1980). A framework for research in computer-based management information systems. Management Science, 26(9), 910-934.

James, L. R., Mulaik, S. A. & Brett, J. M. (1982). Causal Analysis: Assumptions, Models, and Data. Beverly Hills, CA: Sage.

Johns, G. (1981). Difference score measures of organizational behavior variables: A critique. Organizational Behavior and Human Performance, 27(June), 443-463.

Joreskog, K. G. (1993). Testing structural equation models. In K. A. Bollen & J. S. Long (Eds.), Testing Structural Equation Models. Newbury Park, CA: Sage.

Joreskog, K. G., & Sorbom, D. (1992). LISREL VIII: Analysis of Linear Structural Relations. Mooresville, IN: Scientific Software.

Joreskog, K. G., & Sorbom, D. (1993). LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language. Chicago, IL: Scientific Software International, INC.

Jurison, J. (1996). The temporal nature of IS benefits: A longitudinal study. Information & Management, 30, 75-79.

Keen, P. (1980). Reference Disciplines and a Cumulative Tradition. Proceedings of the First International Conference on Information Systems, December.

Keen, P. (1988). Measuring the Business Value of Information Technologies. In ICIT Research Study Team no. 2 (Eds.), Washington, DC: ICF Press.

Kelloway, E. K. (1998). Using LISREL for Structure Equation Modeling: A Researcher's Guide. Thousand Oaks, London: Sage Publications.

Kerlinger, F. N. (1986). Foundations of Behavioral Research (3rd Ed.). New York, NY: Harcourt Brace Jovanovich College Publishers.

Kettinger, W. J., & Lee, C. C. (1995). Perceived service quality and user satisfaction with the information services function. Decision Sciences, 25(5/6), 737-765.

Kettinger, W. J., & Lee, C. C. (1997). Pragmatic perspectives on the measurement of information systems service quality. MIS Quarterly, 21(2), 223-240.

Koh, C. E. & Balthazard, P. (1997). Electronic commerce and the World Wide Web: A framework of business Web use and a study of business Web practices. Proceedings of the 28th Annual Meeting of the Decision Science Institute.

Lainhart IV, J. W. (2001). An IT assurance framework for the future. Ohio CPA Journal, 60(1), 19-23.

Lucas, H. C. Jr. (1978). Empirical evidence for a descriptive model of implementation. MIS Quarterly, 2(2), 27-41.

Luftman, J. (2000). Assessing business-IT alignment maturity. Communications of the Association for Information Systems, 4(14), 1-50.

Luftman, J. N., Lewis, P. R., & Oldach, S. H. (1993). Transforming the enterprise: The alignment of business and information technologies. IBM Systems Journal, 32(1), 198-221.

MacCallum, R. C. (1986). Specification searches in covariance structural modeling. Psychological Bulletin, 100, 107-120.

Magal, S. R. (1991). A model for evaluating information center success. Journal of Management Information Systems, 8(1), 91-106.

Mahmood, M. A., & Mann, G. J. (1993). Measuring the organizational impact of information technology investment: An exploratory study. Journal of Management Information Systems, 10(1), 97-122.

Mahmood, M. A., & Mann, G. J. (2000). Special Issue: Impacts of information technology investment on organizational performance. Journal of Management Information Systems, 16(4), 3-10.

Marsh, H. W., Balla, J. R., & MacDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. Psychological Bulletin, 88, 245-258.

Mason, R. O. (1978). Measuring information output: A communication system's approach. Information & Management, 1(5), 219-234.

McCall, C. H., Jr. (1982). Sampling and statistics handbook for research. Ames, IA: Iowa State University Press.

McGrath, J. E., Martin, J., & Kukla, R. A. (1982). Judgment Calls in Research. Beverly Hills, CA: Sage.

Mertler, C. A., & Vannatta, R. A. (2001). Advanced and Multivariate Statistics: Practical Application and Interpretation. Los Angels, CA: Pyrczak Publishing.

Myers, B., Kappelman, L., & Prybutok, V. (1998). A comprehensive model for assessing the quality and productivity of the information systems functions: Toward a theory for information systems assessment. In E. Garrity & L. Sanders (Eds.), Information System Success Measurement (pp. 94-121). Harrisburg, PA: Idea Group.

Nunnally, J. (1978). Psychometric Theory (2nd Ed.). New York, NY: McGraw Hill.

Norris, D. F., Fletcher, P. D., & Holden, S. H. (2001). Is your local government plugged in? Highlights of the 2000 electronic government survey. Working paper, University of Maryland, Baltimore County.

Parasuraman, A., Zeithaml, A. V. & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. Journal of Marketing, 49(4), 41-50.

Parasuraman, A., Zeithaml, A. V. & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring user perceptions of service quality. Journal of Retailing, 64(1), 12-40.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1991). Refinement and reassessment of the SERVQUAL scale. Journal of Retailing, 67(4), 420-450.

Patterson, D., & Hanson, W. (2001). 21st century government: Principles for transformation. Government Technology. Retrieved April 18, 2001 from the World Wide Web: http://www.erepublic.com/publications/21stCentury/intro.phtml

Pedhazur, E. J. (1982). Multiple Regression in Behavior Research: Explanation and Prediction. New York, NY: Holt, Rinehart and Winston.

Pitt L. F., Watson, R. T., & Kavan, C. B. (1995). Service quality: A measure of information systems effectiveness. MIS Quarterly, 19(2), 173-188.

Prybutok. V. R., & Spink, A. (1999). Transformation of a healthcare information system: A self-assessment survey. IEEE Transactions on Engineering Management, 46, 299-310.

Ryan, C., & Cliff, A. (1996). Users and non-users on the expectation item of the SERVQUAL scale. Annals of Tourism Research, 23, 931-934.

Ryan, C., & Cliff, A. (1997). Do travel agencies measure up to customer expectation? An empirical investigation of travel agencies' service quality as measured by SERVQUAL. Journal of Travel &Tourism Marketing, 6(2), 1-31.

Saxe, R., & Weitz, B.A. (1982). The SOCO scale: A measure of the customer orientation of salespeople. Journal of Marketing Research, 19, 343-351.

Seddon, P. B. (1997). A re-specification and extension of the DeLone and McLean model of IS success. Information Systems Research, 8(3), 240-253.

Seddon, P. B., & Kiew, M. Y. (1994). A partial test and development of the DeLone and McLean model of IS success. Proceedings of the International Conference on Information Systems. Vancouver, Canada, 99-110.

Shannon, C. E., & Weaver, W. (1949). The Mathematical Theory of Communication. Urbana, IL: University of Illinois Press.

Stanley, J.C. (1967). General and special formulas for reliability of differences. Journal of Educational Measurement, 4(4), 249-252.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. Multivariate Behavioral Research, 25, 173-180.

Tague-Sutcliffe, J., Vaughan, L. & Sylvain, C. (1996). Using LISREL to Measure the Impact of Information on Development: London Site Pilot Study. International Development Research Center. Retrieved July 3, 2001 from the World Wide Web: http://www.erepublic.com/publications/21stCentury/intro.phtml

Tanaka, J. S. (1993). Multifaceted conceptions of fit in structural equation models. In K. A. Bollen & J. S. Long (Eds.), Testing Structural Equation Models. Newbury Park, CA: Dage.

Teas, R. K. (1993). Expectations, performance evaluation and consumer's perception of quality. Journal of Marketing, 57(4), 18-34.

Teng, J., & Calhoun, K. (1996). Organizational computing as a facilitator of operational and managerial decision-making: An exploratory study of managers' perceptions. Decision Sciences, 27(4), 673-710.

Teo, S. T., & Wong, P. K. (1998). An empirical study of the performance impact of computerization in the retail industry. Omega International Journal of Management Science, 26, 611-621.

The ITG Steering Committee and the IT Governance Institute ™, (2000). ITG (3rd Edition): Control Objectives. Retrieved April 18, 2001 from the World Wide Web: http://www.isaca.org

Thierauf, R. J. (1994). Effective Management and Evaluation of Information Technology. Connecticut, Westport: Quorum Books.

Turban, E., McLean, E., & Wetherbe, J. (1996). Information Technology for Management. New York, NY: John Wiley & Sons, Inc.

United States Department of Commerce (2000). Malcolm Baldrige National Quality Award: Criteria for Performance Excellence.

Van Dyke, T. P., Kappelman, L. A., & Prybutok, V. R. (1997). Measuring information systems service quality: Concerns on the use of the SERVQUAL questionnaire. MIS Quarterly, June, 195-208.

Van Dyke, T., Prybutok, V., & Kappelman, L. (1999). Cautions on the use of the SERVQUAL measure to assess the quality of information systems services. Decision Sciences, 30(3), 877-891.

Wright, S. (1934). The method of path coefficients. Annals of Mathematical Statistics, 5, 161-215.

Wu, H. Y., & Wiebe, H. A., & Politi, J. (1997). Self-assessment of total quality management programs. Engineering Management Journal, 9(1), 25-31.